JUNE
1958
VOLUME 7
NUMBER 6

Battelle Technical Review

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Notes on the Backgrounds of Psychochemistry

Morel mushrooms can now be grown from spore to maturity in 72 hours. To achieve this the mushrooms are grown in vats of pure, aerated nutrient fluid. Battelle technologists are shown here examining specimen mushrooms grown under experimental conditions. The vat-culture method was originally pioneered by Dr. Joseph Szuecs, Hungarian microbiologist. Techniques for large-scale production of the mushrooms are the result of a year's research which was sponsored at Battelle by the Yorktown Products Corporation.

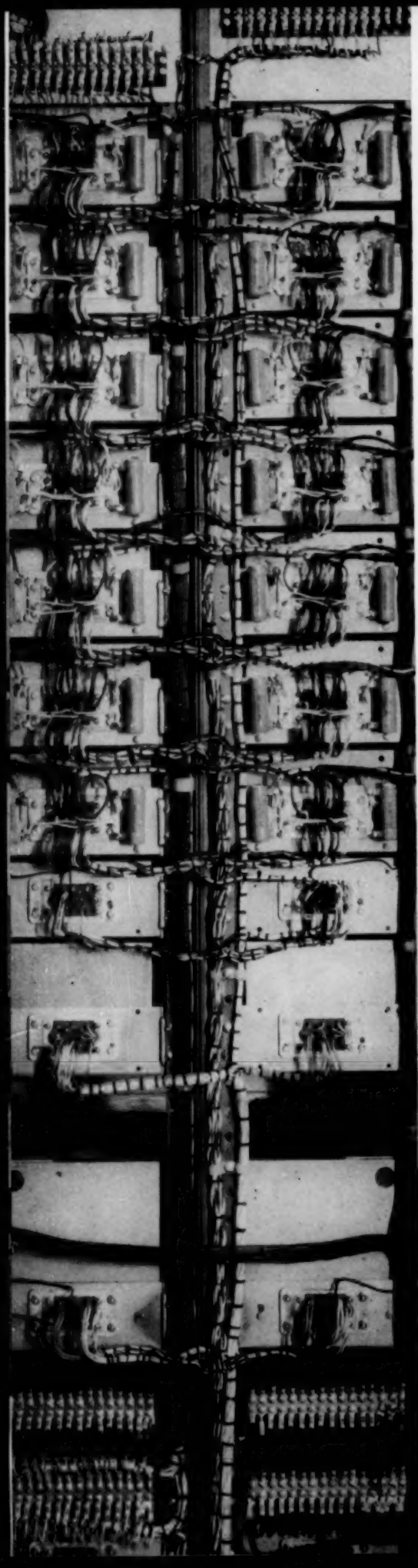
THREE-DAY MUSHROOMS

June 1958
Volume 7, Number 6

BATTELLE TECHNICAL REVIEW

Dedicated to the dissemination of knowledge. Published monthly by Battelle Memorial Institute, an endowed foundation serving mankind through science and technology.

Published monthly by Battelle Memorial Institute. Please address all correspondence about articles, abstracts, subscriptions and exchanges to: The Editor, Battelle Technical Review, Battelle Memorial Institute, 505 King Avenue, Columbus 1, Ohio. Accepted as controlled circulation publication at Columbus, Ohio. Printed in U. S. A.



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Research Reflects Industrial Realism

During periods of business boom . . . companies concentrate their research efforts on aggressive ventures. They look for radically new products to increase their sales, and to revolutionary processes to enhance operational efficiencies. They think in terms of expansion . . . They do what we call "offense" research—spending their research dollars on long-range, aggressive projects.

What happens, though, when the halcyon days are over, when sales resistance mounts, when inventories start to build up?

As might be expected, research budgets are scrutinized and the cuts begin. Ill-considered programs go first and then the longer-range and less promising "offense" programs that look too far into the future. Research cutbacks in individual industries start occurring before the national indices on industrial production clearly show a decline. Then, about the time that the recession has come to the attention of the general public, progressive companies are facing up to their problems and beginning to expand research programs again. But the new programs are reoriented ones, with the frills gone and technology enlisted seriously in an effort to solve current problems. Production cost-cutting is emphasized; minor changes in product are pushed; inexpensive diversification is sought; material changes are tried; and major effort is spent on tying up loose ends in operations and putting the company in a better position to weather the storm. This research is "defensive", as contrasted to the "offense" research that prevails at the height of the boom. Of course, companies with wide experience and understanding in research carry on aggressive programs through thick and thin, but even these give increased attention to defensive research during recession periods.

Such consolidation activities at the laboratory level have a salutary effect. They, along with the other consolidation activities the company undertakes, help turn the tide. As past, but inconclusive, experience seems to indicate, the new upward trend in industrial research predicts the beginning of the end of the recession. The change in the research pattern is but a common-sense approach to recession difficulties, and once all industry gets on a realistic basis—providing extraneous factors do not intervene—our economy is destined for recovery.

From an address by **David C. Minton,** vice president, Battelle Memorial Institute, before Cleveland, Ohio, civic leaders, May 1, 1958.

VIGNETTE

ENGINEERING PHYSICIST

HORACE J. GROVER

Each of the construction materials available for our use has its advantages and limitations. The more we know about a material, says Battelle physicist Horace J. Grover, the better we can circumvent its limitations and make the most of its useful characteristics. But Horace points out that knowledge is not enough; we must also shed our traditional ideas and preconceptions if we are to utilize materials near the limits of their capabilities.

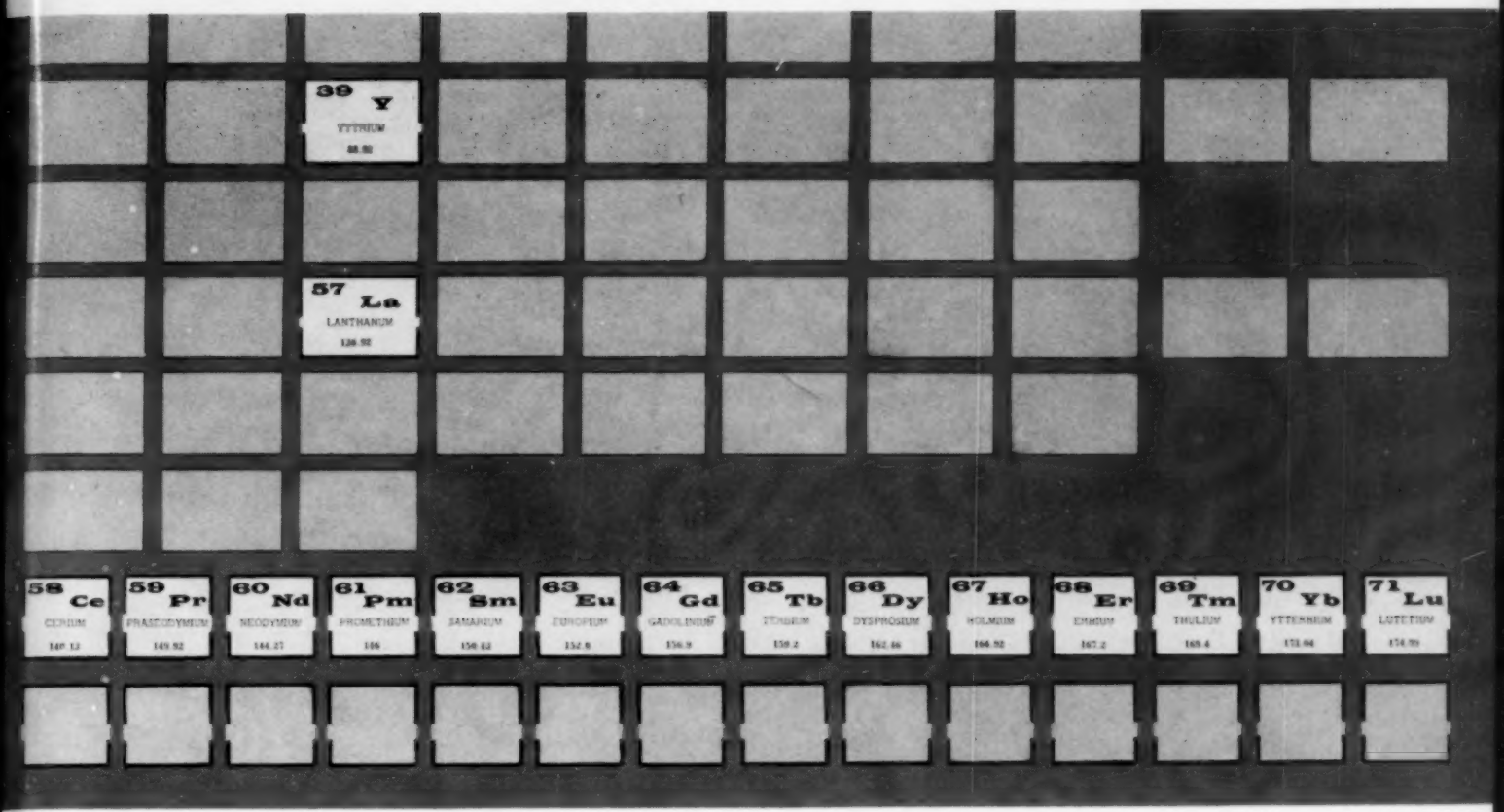
In his more than 16 years at Battelle, Horace has studied the properties and uses of materials from many aspects. He has undertaken investigations relating to stress analysis and structural design involving engine structures and components, pipe lines, pressure vessels, wooden structures, and varied metal products. Fatigue studies with which he has been associated have determined design data on common and unusual metals as well as on plastics and ceramics.

Horace and his co-workers have developed designs for machines and components and designed and developed equipment for vibratory and abrasive drilling of rock. They have also studied springs, ranging from large automotive springs to tiny diaphragms for highly specialized uses. In connection with this research, Horace has guided investigations of the mechanical properties of materials under various loadings and environments. Properties studied have ranged from conventional tension, compression, bending, and torsion behavior to such exacting concerns as hysteresis and dimensional stability. Special measurement techniques for evaluating the static and dynamic strengths of materials have also been created. Horace has reported many of these research accomplishments in some 50 published papers.

Materials research interests are reflected in Horace's professional society activities. He is a Fellow of the American Physics Society. His membership in the American Society for Testing Materials has led also to membership on the Society's Fatigue Committee E-9 as well as chairmanship of its Survey Subcommittee and on the Soil Mechanics Committee D-18. He is a charter member and an active participant in the affairs of the Society for Experimental Stress Analysis.

Prior to his association with Battelle, Horace taught physics at Rensselaer Polytechnic Institute. His professional training included work for an A.B. degree in mathematics and an M.A. in physics at the University of Rochester and for a Ph.D. in physics at Cornell University.

The primary interest of Horace and his wife Betty is their daughter Anne, now in college. Horace enjoys painting in water colors. Both he and Betty are active in church and community affairs.



Where Are The Rare Earths Today?

The values of the rare earths are already recognized in many industries. Research now going on and planned will help make the materials significant in many products and processes. Moreover, price decreases that may be expected to follow more balanced uses of the rare earths, will further extend their industrial utilization.

by Richard C. Himes

Since the beginning of the present decade, readers of the technical and industrial literature frequently have encountered titles such as "Rare Earths at the Cross-Roads", "Rare Earths Arrive", "Rare Earths Raring to Go". The feeling has been widespread that these materials, once laboratory curiosities, have been on the verge of assuming major industrial importance. Some writers suggested that the rare earths collectively may be the panacea for a broad spectrum of industrial problems. Yet no really solid announcements of large-scale exploitations of this great potential have been forthcoming. Let us explore the situation to see where the rare earths stand today.

Briefly, the rare-earth metals are a highly reactive, closely related group of chemical elements (atomic numbers 57 through 71). Their close similarity is accounted for by their basic electronic structures. All have the xenon atom core and three outer electrons, which determine, largely, the chemical properties of the elements; and they differ only in the numbers of

electrons in intermediate levels, which affect size and chemistry of the atoms only slightly. Although not actually a member of the series, yttrium, atomic number 39, is generally included in any treatment of the rare earths, since it almost invariably is found in rare-earth ores and is a very close relative, chemically. The close similarity among the rare earths is at once responsible for the slowness in their industrial development and for much of the interest in them. The slight differences among members of the series make possible subtle adjustments, by choosing one or another, in efforts to "tailor-make" materials to specific applications. Such subtleties are seldom possible in material-development research.

Problems of Availability

The rise of rare earths to industrial prominence was hampered until the last decade both by the relative scarcity of commercial ore deposits and by the difficulties of winning the materials from the ores and of separating the individual members of the group. Although the rare earths as a group are more abundant in the earth's crust than such "common" metals as copper, lead, zinc, and tin, concentrations in economically workable deposits are much more scarce. Up until about 1948 the world was dependent mainly on alluvial beach deposits in India and Brazil for supplies of monazite (the then major mineral source of rare earths) which were limited in availability to about 5,000 tons per year. The close association of thorium with monazite, and its potential importance in nuclear energy developments, resulted in the placement of embargoes on exports of monazite by India and Brazil beginning in the late 1940's, and still continuing. Prices for monazite soared from around $70 to $400 per ton, and exploration for new deposits was pushed hard. Discoveries of monazite in Idaho, the Carolinas, and in South Africa, plus the huge bastnasite deposit in California turned a serious raw material shortage into a huge surplus.

Also during the post World War II period, important strides were made in developing improved methods for extracting rare earths from their ores and for separating individual members of the group. Earlier difficulties in separation could be ascribed to the extreme chemical reactivity and chemical similarity of the rare-earth elements. Indeed, when in 1794 Johann Gadolin, the Finnish chemist, discovered a new metallic oxide (in a recently discovered mineral from Ytterby, Sweden), he considered the oxide that of a single metal. This oxide, named yttria, was later found to contain a second oxide which was given the name ceria. For many years thereafter, only the two oxides were recognized, and they were thought to be simple oxides. It has been only relatively recently that all the rare earths have been isolated and firmly identified*, and they are still classified into two subgroups according to their association with those oxides. The cerium (or light) subgroup consists of elements 57 through 63, and the yttrium (or heavy) subgroup, of elements 64 through 71. Even today, no one rare-earth metal enjoys the industrial prominence of misch metal, an alloy of the metals in proportions roughly as they occur in their more common source minerals. This alloy, rich in the more abundant, light rare earths and usually containing some iron, constitutes the common lighter flint.

The separation problem has been responsible for much confusion in the technical literature on the rare earths. Until recently, the individual elements were available only in very small quantities and in rather low purity. Hence, much erroneous information has been published, and accepted, in the absence of more reliable data. Since World War II, however, suitable separated materials, of established purity, have become available in ever-increasing quantity, and rapid progress is being made in the collection of the fundamental property data which must form the basis of any sound technology. Under the light of critical examination, this progress, more than any other factor, justifies optimism over the future of rare earths.

Current enthusiasm over the rare earths as industrial materials stems from the new-found feasibility of large-scale production. Our nation's atomic energy program has given these elements a tremendous boost. This program has made necessary the production of

*Element 61 (promethium) still has not been found as a naturally occurring element, but has been clearly identified among nuclear fission products.

Dr. Himes' interest in the applications of the rare earths stems from his participation in utilization research on these materials and on others such as tellurium and selenium. Since his association with Battelle, the author has conducted studies on the thermodynamics of polyphase systems and the structures of solids. He has also participated in studies of the effects of trace impurities in the properties of metals and semiconductors, which led to materials purification research. Recently Himes has been associated with studies on the demineralization of saline waters by zone freezing. Before joining the Institute staff, he carried on chemical separation studies at Monsanto. He received his Ph.D. in physical chemistry from The Ohio State University.

large amounts of thorium. The average domestic monazite contains less than six per cent thorium. Hence, a great volume of the ore must be processed. After the thorium has been removed, rich concentrates remain from which rare earths may be extracted in volume. Such availability, plus the development of reasonably economical separative methods (based primarily on ion-exchange reactions), has made large-scale use of rare earths feasible.

The salutary effect of this environment is reflected in the cost data presented in the table on page 7. The figures illustrate the progress of the rare-earth industry in the past 10 years. These data notwithstanding, one serious hurdle still in the path of the growth of the rare-earth industry is the high (in terms of industrial chemicals) cost of individual elements and compounds. This matter of cost creates something of a dilemma. Costs cannot be much further reduced until large-scale demands develop, and demands are not likely to rise significantly until prices come down. However, there is one possible point at which this vicious circle may be broken. At present, the cost of processing a group of the materials must, in many cases, be borne by income from sale of one component for which demand exists. If more balanced uses of the rare earths (in the proportion of their occurrence in the ore processed) can be developed, eventually they may all become available at quite reasonable prices, as each carries its share of the processing cost. Far-sighted individuals in the industry are now expending considerable effort in this direction. Active research is turning up more and more possibilities.

Electronic and Electrical Uses

The most exciting recent development in rare-earth technology is the recognition of the special ferrimagnetic properties of rare earth-iron garnets of the type $3\ (R.E.)_2O_3 \cdot 5Fe_2O_3$. These crystalline materials are now being introduced into the market as "ferrites". The low electrical conductivities and low eddy-current losses of these garnets make them especially valuable as magnetic-core materials in microwave and television applications. The excellent reproducibility of these garnets and their low resonance-line widths (a measure of selectivity of signals) make them superior to the less expensive spinel ferrites in many applications. The yttrium-iron garnet has shown greatest promise to date. It has been prepared as polycrystalline masses which exhibit densities up to 96 per cent of theoretical and line widths less than 50 oersteds. (Line width is a function of porosity.) Methods of incorporating rare earths more effectively in crystalline structures are being explored in the hope of developing still more

Comparison of Approximate Prices of Selected Commercial Rare-Earth Materials (Comparable Purities and Lots) 1948-1958

Material	1948 Price, $	1958 Price, $
Misch metal[a]	4.00/lb.	3.00/lb.
Cerium metal (98+ %)	50.00/lb.	24.00/lb.[b]
Gadolinium metal (? %)	not offered	350.00/lb.
Dysprosium metal (? %)	not offered	350.00/lb.
Neodymium Oxide (99.+ %)	0.17/g.	0.11/g.
Yttrium Oxide (99.0 %)	2.50/g.	0.35/g.
Praseodymium Oxide (99.9 %)	3.00/g.	0.25/g.
Samarium Oxide (99.9 %)	7.00/g.	0.25/g.
Gadolinium Oxide (99.9 %)	40.00/g.	0.55/g.
Europium Oxide (99.5+ %)	400.00-850.00/g.	2.00/g.
Thulium Oxide (? %)	2,800.00/g.	13.35/g.

(a) Misch metal may be described loosely as an alloy of rare-earth metals, roughly in proportions as they occur in the ore. Various quantities of iron may be included. Rare-earth chloride, the salt of misch metal, is now available at 0.25/lb.

(b) For metallurgical development work iron-free cerium metal of 95+% purity, is available at 15.00/lb.

useful magnetic materials. Also, certain of the rare-earth elements themselves have been shown to possess magnetic properties which may be useful. In general, the rare earths are strongly paramagnetic (i.e., attracted by a magnetic field) at ordinary temperatures. In addition, some of the elements are ferromagnetic (may be made to attract paramagnetic materials) at low temperatures. Transition temperatures between these two states range from 15 C for gadolinium to about —220 C for erbium. Certain of these metals, such as, lanthanum, gadolinium, erbium, and dysprosium also exhibit superconductivity at very low temperatures. Scientists anticipate that these special low-temperature properties may make the materials useful in such new devices as cryotrons—memory and control devices that operate at extremely low temperatures.

The electronic structures of the rare earths are largely responsible for their present large-volume uses in lighter flints and arc carbons; this characteristic may become the basis for other major applications. The rare earths have been tested and found useful as activators in phosphors. Television has, of course, sharply increased our phosphor requirements. However, special phosphor needs will multiply greatly as newer developments, such as wall-panel lighting, become household items. Rare earths may find important outlets in these areas. A second area in which the electronic structures of these elements make them useful is that of electron emitters. Rare-earth oxides, alone and in combination with thoria, have been found useful in vacuum tube cathodes and appear to have a future here. (It is appropriate to mention at this point that rare earths have also shown special usefulness as getters, i. e., scaven-

SOME PROPERTIES OF THE RARE EARTHS AND YT

Element	Atomic Number	Atomic Weight	G per Ton of Earth's Crust	Crystal Structure	Atomic Radius (Å)	Density (g per cc)	Melting Point C	Cross Section[2] (Barns per Atom)	Sta Oxid Sta
Yttrium	39	88.92	31.0	H.C.P.	1.78	4.47	1552 ± ?	1.38 ± 0.14	+ 3
Lanthanum	57	138.92	19.0	H.C.P.	1.87	6.16	920 ± 5	8.9 ± 0.3	+ 3
Cerium	58	140.13	44.0	F.C.C.	1.825	6.77	804 ± 5	0.70 ± 0.08	+ 3
Praseodymium	59	140.92	5.6	H.C.P.	1.824	6.77	935 ± 5	11.2 ± 0.6	+ 3
Neodymium	60	144.27	24.0	H.C.P.	1.818	7.01	1024 ± 5	46 ± 2	+ 3
Promethium	61	(147)	No Stable Isotopes	F.C.C.					+ 3
Samarium	62	150.43	6.5	Rhombohedral	(1.8)	7.54	1052 ± 5	5500 ± 200	+ (
Europium	63	152.0	1.0	B.C.C.	2.056	5.17	900 ± ?	4600 ± 400	+ 2
Gadolinium	64	156.9	6.3	H.C.P.	1.794	7.87	1350 ± 20	46,000 ± 2000	+ 3
Terbium	65	159.2	1.0	H.C.P.	1.773	8.25	1400 – 1500	44 ± 4	+ 3
Dysprosium	66	162.46	4.3	H.C.P.	1.769	8.56	1475 – 1500	1100 ± 150	+ 3
Holmium	67	164.94	1.2	H.C.P.	1.759	8.80	1475 – 1525	64 ± 3	+ 3
Erbium	68	167.2	2.4	H.C.P.	1.748	9.06	1475 – 1525	166 ± 16	+ 3
Thulium	69	169.4	0.3	H.C.P.	1.742	9.32	1500 – 1550	118 ± 6	+ 3
Ytterbium	70	173.04	2.6	F.C.C.	1.940	6.96	824 ± 5	36 ± 4	+ 2
Lutetium	71	174.99	0.7	H.C.P.	1.737	9.85	1650 – 1750	108 ± 5	+ 3

1. Data represent room temperature values unless otherwise indicated. Not all data uniformly accepted; apparent best values given.
3. Electrode potential on the hydrogen scale for the reactions $M_s = M^{+3} + 3e$.

gers for traces of gas left within sealed vacuum tubes.)

The electrochemistry of the cerous-ceric couple has been suggested as the basis for storage batteries and solar batteries, or more properly, solar-energy converters. Potentials of 2.2 volts have been observed in cells consisting of misch metal and platinum electrodes and cerous-ceric electrolyte. Theoretical considerations indicate that potentials of 3.5 volts or more may be expected when misch metal is replaced by the iron-free cerium metal now available. Another use of cerium in the storage battery field may result from its ability to suppress polarization at electrodes and thus make possible the drawing of increased currents.

The semiconductor industry has been growing rapidly in recent years as new uses are found for semiconductors in the control and generation of electrical currents and in optical-electrical systems. Currently, the compound semiconductors are the object of increasing attention as technologists discover their special properties—properties different from those of the elemental semiconductors, germanium and silicon. Known relationships between crystal structure and semiconducting properties suggest that a number of rare-earth compounds may become valuable as semiconducting materials.

Rare Earths and Nucleonics

Research results indicate that several rare-earth materials may be of special value in the field of nucleonics. The absorption cross sections (for thermal neutrons) of the elements under consideration in this article range from about 46,000 barns for gadolinium to 1.37 barns for yttrium. Materials with cross sections at both ends of this range are especially valuable as reactor materials.

Materials with very high cross sections are needed for control rods (to control the rate of fission in a nuclear reactor by absorption of neutrons) and neutron shields. The characteristics desired in such neutron-absorbent materials include: (1) relatively high cross sections, (2) radioactive decay, after neutron absorption, into daughter atoms of high cross section, (3) high-temperature stability, (4) good radiation stability, and (5) ease of fabrication into special geometries.

Among the "more common" elements, boron (750 barns), cadmium (2400 barns), and hafnium (115 barns) all have fairly high cross sections and have been considered for control-rod and shielding applications. However, each of these materials is deficient in at least one of the above-mentioned requirements.

AND YTTRIUM[1]

tion[2] Atom	Stable Oxidation States	Oxidation Potential[3], (volts)	Ionic Radius (Trivalent), Å	Magnetic Susceptibility (Magnetons)	Colors of Typical Salts
0.14	+ 3		1.06	0	Colorless
0.3	+ 3	+ 2.4	1.06	0	Colorless
0.08	+ 3,4	+ 2.34	1.03	2.56	Red, yellow, colorless
0.6	+ 3, (4)	+ 2.2	1.01	3.62	Green
2	+ 3	+ 2.24	1.00	3.68	Red-violet
	+ 3		(0.98)	(2.83)	Pink
200	+ (2), 3	+ 2.2	0.96	1.55	Yellow
400	+ 2, 3	+ 2.2	0.95	3.4	Rose
2000	+ 3	+ 2.2	0.94	7.9	Colorless
4	+ 3, 4	+ 2.2	0.92	9.7	Rose
150	+ 3	+ 2.2	0.91	10.6	Yellow-Green
3	+ 3	+ 2.1	0.89	10.6	Yellow-Brown
16	+ 3	+ 2.1	0.88	9.6	Pink-Red
6	+ 3	+ 2.1	0.87	7.6	Green
4	+ 2, 3	+ 2.1	0.86	4.5	Colorless, green
5	+ 3	+ 2.1	0.85	0	Colorless

2. Cross section for capture of thermal neutrons.

Gadolinium, samarium (5500 barns), and europium (4600 barns) all have extremely high cross sections and may well provide the best answers to control and shielding problems. To date, the greatest impediment to the development of these materials for use in reactors has been the lack of suitable fabrication techniques. Current research is aimed at overcoming these difficulties. Some of these fabrication studies are mentioned in subsequent sections of this article.

At the opposite end of the scale, yttrium is of special interest. Its neutron-absorption cross section is among the lowest for structural materials, making it almost transparent to neutrons. This property, in combination with its high melting point (1552 C) and its low density (4.47 grams per cubic centimeter), makes yttrium especially attractive for use in certain reactor structures where stability, weight, and high-operating temperatures are important considerations.

Use in Ceramics

For some years the ceramic industry has been a major user of rare-earth materials. It consumes large quantities of cerium oxide and mixed rare-earth oxides, which have largely displaced rouge as a polishing agent in numerous applications. The rare earths have also become important in the industry as coloring agents, decolorizers, and opacifiers. Didymium* glass, because of its extremely strong absorption in the yellow portion of the spectrum, has been of great value in welders' and glass-workers' goggles. More recently, ceramists have used rare-earth oxides to increase the radiation stability of glasses. For example, they aid in suppressing the development of the typical dark-brown coloration in glasses exposed to gamma radiation. Purified lanthanum oxide has been found useful in preparation of high-quality optical glass having a high degree of refraction and very little dispersion.

The rare earths offer ceramists another area for development—high-temperature refractories. Yttrium oxide, for example, has a melting point in excess of 2400 C. Cerium monosulfide (melting point, 2500 C) is reported to be readily fabricable into desired shapes, and it also resists spalling. This, and other rare-earth compounds with the heavier group-VI elements, may be useful in applications where the ordinary oxidic refractories are unsuitable. The borides and carbides may also find applications as specialized refractories. Furthermore, as costs are lowered, certain of the refractory rare-earth oxides may be considered as special colorants for ceramic materials, particularly for developing the highly prized pastel colors.

Research on cermets containing rare-earth oxides has also met with some success. Metal-ceramic bodies, made by dispersing such oxides (up to about 40 per cent) in a metal matrix, particularly stainless steel or titanium, have been fabricated, and they show promise as reactor control-rod materials.

A newly developed process for flame spraying of refractory oxides opens the way for still another application. Flame-sprayed cerium oxide, for example, has been shown to have unusually good heat radiation properties. Its application to surfaces from which the rapid radiation of heat is desired may, in the future, constitute an important rare-earth use.

Metallurgical Uses

In the past, metallurgical applications of rare earths have been confined largely to the light rare earths, primarily cerium and misch metal. Producers have been making moderate use of these materials in alum-

*Didymium, traditionally, is a mixture of neodymium and praseodymium, once thought to be a single element. The didyminum now offered commercially however, essentially the naturally occurring rare-earth mixture with the cerium extracted and contains, in addition to neodymium and praeseodymium, significant quantities of lanthanum, samarium, and gadolinium.

inum and magnesium alloys (to increase strength), in cast iron, plain carbon steels, and low alloy steels (to improve ductility and notch-bar strength), in stainless steels (to increase fluidity and improve workability), and also in other alloys in smaller quantities. Extended utilization of rare earths in these areas appears to be awaiting either sharp reductions in price or demonstration of the roles which individual misch-metal components may play in metallurgical processes. The desirability of studies along these lines is clearly indicated.

Detailed study of the mechanical properties of the individual rare-earth elements has not been possible until recent years. Research now in progress should lead to new applications in the near future. Data already available indicate that hardnesses of the metals range roughly from values comparable to those of lead and tin to that of mild steel. Melting points range from 804 C for cerium to about 1700 C for lutetium. Hot and cold rolling, forging, and extrusion have been successfully carried out with some of the metals in the laboratory. There seems to be no reason why such methods cannot be satisfactorily applied commercially when proper conditions have been spelled out.

Some of the needs for high-temperature metals may be satisfied by rare-earth metals and their alloys. Except for ytterbium, all of the rare-earth metals heavier than europium, have melting points in excess of 1300 C and are accordingly ranked as high-melting metals. The current trend in our technology toward ever-higher temperatures may be expected to thrust these into greater prominence as structural metals or alloying agents.

Catalysis and Other Uses

The oxides of a number of the rare earths have been reported to exhibit catalytic activities, particularly in dehydration and dehydrogenation reactions. The oxides of yttrium, cerium, samarium, gadolinium, and dysprosium have shown such activity. Cerium oxide has been found especially active when supported on magnesia, alumina, or silica. A samarium oxide catalyst, supported on alumina, appears to be of special interest in cyclization of hydrocarbons and in the dehydrogenation of cyclohexane to benzene. Both samarium oxide and gadolinium oxide have been reported to effect the ortho-para hydrogen conversion.

The rare-earth metals themselves have been considered as potential catalysts. If any of them should prove to be equal in performance to the currently employed rare-metal catalysts, palladium, rhodium, and platinum, the rare earths could well hold an appreciable economic advantage. The increasing availability of high-purity rare-earth metals, together with the prospect of decreasing prices, make this an attractive field for further study.

Investigations have shown that rare-earth materials are also useful as catalyst additives. Many who have studied the problem believe that the brightest hope for rare-earth use in catalysis lies in this field. Unfortunately, for the rare earths, such use probably would not create a large demand. Nevertheless, the limited demand might be significant for some of the less abundant elements.

Possible applications of rare earths in other industries are under study. Water-proofing, mildew-proofing, and mordanting (or dye-fixing) properties of cerium salts have been studied. The paper, textile, and leather industries all have need of materials with these properties. Cerium salts used in tanning have been reported to yield high-quality leather which is highly water resistant and has a slightly yellow tone. Organic chemical compounds of the rare earths, particularly their naphthenates, have valuable paint-drying properties. The biological activity of some of the rare earths may be of interest. Lanthanum, for example, has been used in beauty preparations and in sea-sickness remedies. Rare earths have been studied, too, as pigments and fillers for paints and plastics. Polyethylene can be fabricated to hold up to ten times its weight of rare-earth oxide. Extended commercial applications in all these areas await further technological development.

The Prospect

The tremendous potential of the rare earths is already recognized in many industries. However, there is hard work yet to be done in the study of the properties of all the rare earths and their compounds and in applications research. Only through such studies will the required new technology be developed.

At present, some 1500 tons of rare-earth materials are consumed annually. Yet the present domestic capacity for processing monazite alone can provide some 10,000 tons of the materials per year. When the relatively extensive facilities for processing bastnasite, euxenite, and other rare-earth minerals are added, the United States has the productive capacity required for a major industry. Furthermore, the discovery of the huge domestic deposits of bastnasite have removed any concern for the long-range supply picture.

The rare earths stand on the brink of a useful future. The research now going on and planned will help make them significant materials in many products and processes. As more balanced uses of the rare earths are achieved, price decreases will follow. Industrial uses will then develop in many of the areas discussed in this article, and in others not yet conceived.

Notes on the Backgrounds of Psychochemistry

by EDWARD L. KROPA

Men have utilized psychochemicals for religious purposes and for pleasure during thousands of years. Now scientists are studying the effects of these compounds upon human moods and behavior. Chemists are playing their part by characterizing, and, in some cases, synthesizing, compounds which psychiatrists and others can use in experimental studies.

IT IS RELATIVELY EASY to deduce the meaning of psychochemistry; it involves a subject comprising butterflies and the black alluvial soil of Egypt. In any manner that psychochemistry is examined, forward or backward, that is, as psychochemistry or as chemopsychiatry, the word is a barbarism. First of all, it is a hybridization of a Greek word initially meaning butterfly, but which was later sublimed to mean soul or spirit together with another word of mongrel ancestry. It is also a hybrid of two entirely different conceptual meanings involving living and dead concepts. The older meaning of chemist, as distinguished from a druggist, was one who handled mineral materials; the druggist handled vegetable compositions. In this light we have terms involving dead material combined with the soul or psyche, where the latter suggests the preservation of life not only in our present scheme but may be extrapolated to one after death. In this sense one could even consider psychochemistry as involving the chemical reactions even in afterlife.

The definition of "psychochemistry", which appeared in the 1913 edition of the *Century Dictionary*, may have stemmed from studies carried out by J.L.W. Thudichum. His work, entitled *A Treatise on the Chemical Constitution of the Brain*, and based upon original research, was published in 1884.

One of the first explanations of psychochemistry which approaches the modern view was presented in a paper by Walter Freeman in the *Journal of the American Medical Association*, 1931, 97, 293. Broadly speaking, Freeman considered psychochemistry as the application of biochemistry to the study of behavior. He recognizes certain of the above reservations that in an interdisciplinary area there can be no sympathy for someone else's viewpoint, particularly where biochemists have little knowledge of psychiatry and where psychiatrists have little or no understanding of chemical reasoning and terminology. He conceived of psychochemistry as that area comprising psychiatry and chemistry which is directed toward the study of behavior from the viewpoint of the altered chemical reactions of the central nervous system. In his paper he discussed various chemical aspects of dementia praecox, the manic depressive, the paranoiac, and the epileptic.

Use of the term psychochemistry was revived about two years ago in a joint symposium arranged by Battelle and Fels Institutes. At that meeting chemists and psychiatrists, along with pharmacologists, physiologists, and others, assembled for one of their rare discussions of mutual problems and sought to more fully understand each other's viewpoints.

Actually, psychochemistry is but one of a large number of what might be termed fields of force which interest investigators into the activity of the brain. Some of these fields stem from Sigmund Freud; others from Ivan Pavlov; and still others grew out of the investigations of physiologists into the reactions involved in nerve fibers and in nerve cells. Part of the understanding derived from psychochemistry is that we can adjust some of our nervous activity through the use of chemical agents such as coffee, tea, alcohol, and tobacco. With more powerful reagents, gross changes may occur in nervous tissue and even in the brain.

No attempt will be made to distinguish psychochemistry from neurochemistry. It is apparent that terms such as psychotropic and neurotropic drugs arise from pharmacology as well as from the behavioral sciences. At the present time pharmacologists have difficulty in distinguishing psychopharmacology from neuropharmacology, and there is some suggestion that consideration is being given to autonomic pharmacology. For our immediate purpose, psychochemical compounds are those materials which profoundly modify mood and behavior. The techniques by which the change is effected lies outside the domain of chemistry, at least in the present state of our knowledge.

It is now generally recognized that there are a num-

ber of compositions, called psychotomimetic, which yield a short-term schizophrenic reaction sometimes called a "model psychosis". The first real insight into model psychoses occurred with the use of D-lysergic acid diethyl amide (LSD). Once the reactions of this composition were known, it was quickly recognized that there were parallels between LSD and a number of other materials such as mescaline and marihuana.

In examining the literature, one can find numerous references to the use of chemical compounds for inducing temporary insanity and other mental states. Many of these accounts date back to the Greek and Roman writings, while others describe the use of psychotomimetic compounds by primitive peoples all over the world. These bits of information have led to the discovery of various chemical compositions that appear to have a pronounced relationship to psychotic behavior in man. Once discovered, it has been possible for chemists to isolate, and, in some instances, synthesize compounds of interest.

The following sections describe the best known of the natural psychotomimetic compounds and present some of the historical data about them.

Bufotenine

In Act 4, Scene 1, of *Macbeth*, the so-called Cavern Scene, one may find the ingredients used by the three witches. The first witch says:

> "Round the cauldron go
> In the poisoned entrails throw.
> Toad, that under cold stone
> Days and nights has thirty-one
> Swelter'd venom sleeping got,
> Boil them first in charmed pot."

The second and third witches mentioned other ingredients such as root from hemlock, gall of goat, slips of yew, and baboon's blood. The only ingredient which is immediately of concern to us is the sweltered venom, a milky exudation of the toad.

In this sweltered venom of the month-old toad is found bufotenine. Bufotenine (N, N-dimethyl serotonin) is a substance which is scattered historically, geographically, culturally, and phylogenetically. Plant, as well as animal, preparations containing bufotenine have been used by mankind in a number of eras to produce temporary ecstatic states of depersonalization and hallucination. Bufotenine has been found in such other preparations as narcotic snuff, in mushrooms, and it appears as a constituent in extremely minute amounts in normal human urine.

There is reason to believe that Columbus may have witnessed the use of hallucinating snuff and confused the composition with tobacco. Unlike tobacco, the coboba is snuffed through the nose by means of a bifurcated branch. Recently, Dr. V. L. Stromberg has examined this narcotic snuff and has shown that it contains bufotenine. Other names for the snuff among Indian tribes are naiopo and parica. The composition is prepared from a tree belonging to the mimosaceae. The explorer Baron Heinrich Humboldt reported that the use of the drug by the Indians brought about a state of intoxication and madness.

It was suggested many years ago by Lewin, and more recently by Howard Fabing, that the berserker, the insane warrior of the Viking legends, may have been under the influence of a similar composition which was referred to as the "flugsvamp". These warriors would fight in a frenzy to the point of discarding their armor and rushing into battle as if they were possessed by demons. There are a number of legends about warriors, who, given drinks just before battle, would behave like mad dogs or wolves, performing with superhuman strength.

In a recent experiment, pure bufotenine was injected into human volunteers at the Ohio State Penitentiary. Because they knew of the profound effects that the composition has on dogs and other animals, the experimenters were more afraid than those experimented upon. It was only after 8 mg of bufotenine had been administered that a definite physiological response was noticed. The subjects complained of lightheadedness, and their faces and chests became deep purple, a condition which was followed by nausea and air hunger. There were also definite evidences of hallucinations. Larger doses up to 16 mgs accentuated the response. The most striking symptom was the euphoria which followed in a period varying from a few minutes to a few hours after the injection.

In a second series of experiments, the results of

Dr. Kropa, whose primary research interest is polymeric compounds, believes that the crossing of disciplines can be scientifically profitable. This belief led to his interest in psychochemistry, a combining of psychiatric and chemical research, and a role in research on psychochemicals at Battelle. His interest was also an important factor in the organization of a symposium on psychochemistry in 1955. The meeting, sponsored jointly by Battelle and Fels Institute, brought together not only chemists and psychiatrists, but also neurologists, physiologists, pharmacologists, and physicians for an exchange of views on this approach to the problems of the psyche.

which have not been published, an entirely different approach was used. The purpose of the study was to ascertain whether it would be possible to wash out the effects of bufotenine by means of a tranquilizer. Chemical analysis revealed that about 80 per cent of the bufotenine was excreted in the urine unchanged. In this instance, as in so many experiments with humans, we discovered one factor which had been ignored up to that point—the rate of injection of the drug was extremely critical. If the bufotenine were introduced into the blood stream at a slow enough rate, there was no need to use tranquilizers. We secured no physiological response from their use.

"We will speak of those (medicines) which make men mad! . . . the same plants that induce sleep, if they be taken in larger proportion, do cause madness. But we will not tell those things which breed it forever, only which may make us sport for a day, and afterwards leave no harm."

John Baptista Porta
NATURAL MAGICK (1658)

LSD-25

The modern era of psychochemistry may be traced to the accidental inhalation of a very small quantity of LSD by a scientist in 1943. Since that time there have been hundreds of papers on this reagent and others in journals of psychiatry and mental diseases. LSD-25 has been discussed in papers and magazines, and has even led to a new verb, "to lysergize". The root, lysergic, is derived from the word "lysis" meaning to flow and "ergot", implying that the material is disengaged from ergot. For this reason it might be desirable to secure a speaking acquaintance with ergot.

Ergot is a fungus known as *Clavicept purpurea* which grows on rye and other grains. The parasitic nature of ergot was not known until the 19th century. Prior to that time, ergot was merely a diseased rye. This parasite appears during warm, moist weather and may be found in the grain fields of North America and Europe. This contamination of an edible grain by a poisonous fungus spread death and destruction for centuries without the cause being discovered. Curiously enough, the Greeks and the Romans were relatively free from the toxicity of this fungus, primarily because they refused to eat the "black malodorous product of Thrace and Macedonia". It was only in the beginnings of the Christian era that there are undisputed references to the effects of ergot poison. Strange epidemics were described in which the characteristic symptom was gangrene of the feet, legs, hands, and arms. In severe cases, the tissue became dry and black. Often the mummified limbs literally fell off the body.

Lysergic acid was isolated in 1934. From this raw material it became possible to prepare a large number of semisynthetic derivatives. W. A. Stoll and A. Hoffman prepared not only the natural alkaloid ergometrinine (or ergonovine) but, in addition, the diethyl amide to which the laboratory designation LSD-25 was given, the subscripts implying the numbers found in the ethyl group. A number of biological experiments were conducted at the time and described in a pharmacological report. It is noteworthy, however, that LSD-25's psychic activity was not discerned by the conventional screening even though striking excitation in certain of the test animals and a catatonic reaction in others was observed.

Hoffman, who was the scientist who accidentally inhaled LSD in 1943, also was the first to recognize a possible connection between the unusual psychic state which followed, with the substance he had taken in. He described that state as follows:

> "As I lay in a dazed condition with my eyes closed . . . there surged in upon me an uninterrupted stream of phantastic images of extraordinary vividness and accompanied by an intense, kaleidoscope-like play of colors. The condition generally passed off after about two hours."

In order to make certain that LSD was responsible for the reaction, he took 0.25 mg of the drug. Previous experience with ergot indicated that this could be considered a relatively small dose. We know now, of course, that the quantity represents five to ten times the dosage sufficient to cause major disturbances in normal subjects. We also know that enough material can be imbibed through aerosols to be potentially dangerous. Workers handling the drug are required not only to wear face masks but ear plugs as well, because sufficient quantities of LSD can be received through the ear passages to cause disturbances.

IBOGA

Strangely enough, there is another compound closely related to LSD in the sense that it also possesses an indole nucleus and is also psychotomimetic, and that is iboga. One individual who has had ample opportunity to observe native practices is Albert Schweitzer, who has spent a number of decades in the Gaboon region of West Africa. In one of his earlier books entitled *On the Edge of the Primeval Forest*, Schweitzer noted certain mental disturbances among his patients; some of these were responsive to morphine and

scopolamine, whereas others were refractory to these drugs. Unfortunately, information on these substances was difficult to procure, and whatever information was available was in the hands of secret societies.

More recently, Schweitzer published additional information on these compositions, pointing out that where other cultures had employed opium, peyote, and hashish, the Negroes of the Lambarene employed iboga. In common with substances of this nature, it had a dual role, profane and sacred; profane in the sense that it was employed to secure a temporary respite from labor and sacred in that one secured a state of ecstasy in which one had a feeling of supernatural strength, and in which one would rise above the ordinary conditions of humanity into a world of transcendent imagination. You will note that this is a common experience with all of these reagents.

The iboga plant is used by the natives as a temporary stimulant in small quantities, but taken in larger amounts it appears to cause disequilibrium and mental confusion. Whether we consider the current psychotherapy or the more primitive variety in the jungles, the same reaction appears to recur whether in the witch's sabbat, the rituals of the early American church, or the Greek mysteries of the second century, B.C.

The chemical structure of ibogaine has been worked out recently. It has certain basic resemblances to LSD and it is also related to the harmala alkaloids.

"While the term "psychotropic drug" is now becoming general in medical nomenclature, the search for substances capable of influencing the psyche dates back many ages, an unrelenting and complex search in which empirical observation is interwoven with magical ideation, and therapeutic aims with ritual exigencies."

Luigi Bellini in introduction to PSYCHOTROPIC DRUGS by S. Garattini and V. Ghetti

PEYOTE

The history of peyote, or mescaline, starts with a book by Sahagum entitled *History of the Coast of New Spain*, published in 1569. It should be recognized that this information was published but 50 years after Cortez landed in Mexico. At the time, the Indians were known to use peyote in place of wine, but the drug was confused with a poisonous mushroom because of its strange appearance. Accounts told of ludicrous visions the Indians experienced, and the aborigines were said to have reported that the compound would alleviate fear, give strength, and protect the individual against hunger and thirst.

Little was known concerning the plant until Henning brought a sample to the Botanical Museum in Berlin in 1886, where it was characterized as a new species of *Anhalonium*. Lewin, in 1888 and in 1894, isolated and characterized a number of alkaloids which existed in the plant, the most important of which is mescaline.

Weir Mitchell, a 19th century physician and novelist, wrote an early description of the effects of peyote (Anhalonium Lewinii) on himself, which appeared in the *British Medical Journal* in 1896. Part of this description reads as follows:

> "The display which for an enchanted two hours followed was such as I find it hopeless to describe in language which shall convey to others the beauty and splendor of what I saw. Stars, delicate floating films of color, then an abrupt rush of countless points of white light swept across the field of view, as if the unseen millions of the Milky Way were to flow in a sparkling river before my eyes . . . zigzag lines of very bright colors . . . the wonderful loveliness of swelling clouds of more vivid colors gone before I could name them."

This is an excellent description of the effects. Mitchell also drew attention to the possible anesthetic effects on muscles. Careful reading of the article, however, shows that he saw no relation between the effects of this composition and the possible parallel effects on insanity. Though he was a trained neurologist and psychiatrist, he missed the significance of the effects of the drug on himself.

It remained for K. Beringer, E. Guttman, and G. T. Stockings to realize the close resemblance which existed between mescaline intoxication and schizophrenia. Even more striking in the history of epistomology is the fact that though this relationship had been recognized, its full significance was not understood until after the observations on lysergic acid.

A number of observers have made a distinction between the effects of the intoxication which one secures from pure mescaline as opposed to peyote which contains alkaloids such as anhaline, anhalamine, and lophorphorine, as well as mescaline. The accompanying alkaloids modify to a degree the physiological reaction of the mescaline itself. Moreover, the Indians who employed peyote, used the material in a highly ritualistic environment, usually in the evening before a campfire. They discovered that those individuals who approached the use of peyote in an easy, honest, good-natured frame of mind found that the effects could be pleasant and even euphoric. On the other hand, those individuals who were rough and ill-tempered during

the initiation had a frightening, nightmarish reaction to the compound. In other words, the mood under which the drug was imbibed had an influence on the subsequent visions.

Marihuana

La cucaracha, la cucaracha
Ya no puede caminar
Porque no tiene, porque no tiene
Marihuana que fumar . . .

Down Mexico way, as the song indicates, even a cockroach needs marihuana to secure energy to march. Incidentally, the play on words of cockroach and roach may refer to the butt end of a cigarette which is known as a "roach" or a "crutch" and where the active principle was distilled and condensed during smoking. Marihuana has been employed by a number of native tribes in Africa so extensively that, in certain countries, even children use the drug to add piquancy to their games. The use of this same material by jazz musicians in this country is proverbial. The compound, nevertheless, has a much longer history and wider geography than is generally recognized.

Marihuana masquerades under many names: in Arabia it is called hashish; in Persia it is beng; in Morocco it is kif; in South Africa, dagga; in India it is known as charas, bhang, or gangha. In Mexico and in the United States it is known as marihuana or more conventionally as Mary Werner, as well as by other slang expressions such as drag weed, giggle weed, hay, jive, and rockets. The plant which manufactures this principle is known as *Cannabis indica* or as *Cannabis sativa* in the more recent literature.

Indian hemp, to use still another name, has been known for about two thousand years. The name Cannabis has been traced to the Greek kanabos which means noise and may have been used to describe the noisy fashion and behavior of hemp smokers.

Other background concerning the behavior and pharmacology of marihuana may be found in the studies carried out by Lewin in Germany and by Dr. Roger Adams at the University of Illinois. Through the studies of Dr. Adams, the structure of the active compound has been elucidated, but the state of the art in synthesis at the time was such that the active principle was not prepared directly. Through certain modifications of structure, a number of synthetic derivatives have been prepared, and these compounds are not quite as active as the naturally occurring product. Nevertheless, they offer a chemically pure reagent for evaluation.

It is rather significant that no pharmacological or psychopharmacological use has been made of either the natural or the synthetic product. Efforts have been made to use the marihuana in neurotic and in psychotic depressions but without the marked utility. Some investigators have ascertained no differences between the drug and a placebo.

Conclusion

One might at this stage consider a wide range of other compounds, some of which are well known, others but partially, but all of which disturb mood and behavior. One might mention the ololiuhqui from the Rivea corymbosa, the various opium derivatives, morphine, heroin, N-allyl morphine, and even alcohol, the harmala alkaloids, a derivative known as telepethine, an approach to synthetic ESP, yohimbine, physostigamine, and the synthetic natural Win 2299, and many, many others. Collating the behavioral changes would not assist us in approaching the problem of how these materials work.

It was mentioned earlier that psychochemistry is but one of the fields of force revolving around investigations into the brain. In these investigations chemistry alone is not the major factor. The study of the brain and how it works will require the marshalling of greater knowledge and the synthesis of scientific information on a scale hitherto uncomprehended. The immediate value of psychochemistry is the acceptance of the fact that chemistry may have a contribution to make in this vast subject. At the same time, it must be recognized that the chemist must work along with and understand the language as well as the approaches used by the pharmacologist, the pathologist, the psychologist, the psychiatrist, the clinician, the anatomist, the morphologist, and the endocrinologist. We cannot, of course, overlook the impact of the educator, the anthropologist, even the humanist and the politician. Contributions from all of these disciplines will be necessary if we are to secure an understanding of how the brain functions—without doubt the most challenging of all scientific problems.

"Scientists are impelled by a faith that beneath the apparent complexity of nature there lies a fundamental order. That faith has been rewarded by finding a law of gravitation, revealing a universe of stars instead of chaos."

Joel H. Hildebrand, *Science in the Making*

NOTES from BATTELLE

* LUBRICATION STUDY

"Recent advances in gas turbine power plant systems for aircraft have pointed up how much remains unknown about the critical properties of lubricating fluids. Organic materials, upon which the bulk of lubricant technology has been based, generally are unable to withstand the high temperatures encountered in modern jet engines. Although a great deal of research is currently being devoted to developing lubricants that will hold up under this intense heat, the modest advances which have been made have sometimes been at the expense of other desirable lubricant properties."

The underlying purpose of a lubrication study now in progress at Battelle was thus explained by William H. Goldthwaite who is guiding the work. The research, designed to develop a more fundamental understanding of the mechanisms involved in the lubrication of high-speed ball bearings, is being conducted under contract with the Wright Air Development Center. The study will place emphasis on the role that the physical and chemical properties of lubricants play in the satisfactory performance of gas turbine engine bearings.

"The lack of suitable high-temperature lubricants is one of the bottlenecks in jet engine development", Goldthwaite said. "The research program at Battelle is designed to guide the development of new lubricants by providing basic information on the lubrication of engine bearings", he explained.

This new study will attempt to correlate all information presently available on bearing lubrication, from performance data on bearings to the range of properties offered in present-day lubricants. The specialized knowledge of mechanical engineers, mathematicians, physicists, and chemists will be tapped both within the Battelle staff and from sources in the Air Force and industry. On the basis of this information, a group of lubricants, including synthetic lubricants as well as petroleum oils, will be selected for further study. Later in the program, certain unique experiments with these lubricants will be designed to relate lubricant properties to performance characteristics of bearings.

Among the properties of lubricants under consideration are the variation of viscosity with temperature, pressure, and rate of shear, the density and bulk modulus, viscoelastic characteristics, film-forming behavior, interfacial tension, and corrosivity with the bearing metal, friction and wear behavior, and heat transfer and thermal characteristics.

Technologists point out that much of the past research on lubricants has concerned itself only with the study of properties of lubricants in bulk form, such as the effect of high temperatures on bulk-lubricant deterioration. The Battelle team will study lubricant performance in the small, but critical, areas of near contact, where the ball "rolls" on the raceway in these bearings. This closely defined approach to the problem has been adopted on the premise that the real test of how well a lubricant serves its purpose is its performance in the region where lubrication is most critical.

"This study at Battelle is not aimed at solving specific lubrication problems", Goldthwaite concluded. "It should, however, provide a better base from which research scientists can attack specific problems in the future."

* SELENIUM AND TELLURIUM STUDY

A research program to further understanding and use of selenium and tellurium is under way at Battelle. The program is sponsored by the Selenium and Tellurium Development Committee, which includes eight of the Western Hemisphere's major producers of these copper and lead by-products.

The Committee's arrangement with Battelle provides for a program to investigate and develop new uses for selenium and tellurium. According to Dr. Richard C. Himes, who is coordinating the work at Battelle, laboratory investigations aimed at the use of these elements in metals, organic chemicals, electrochemical solutions, and semiconductor devices have been scheduled. A number of very promising studies are already in progress. Dr. Himes said that, additionally, Institute scientists, representing a broad field of technologies, are cooperating to develop and screen other new ideas for use of the materials. The more promising ideas will be selected for further study.

Battelle and the companies financing the Committee's work have been closely associated in the past on

research involving selenium and tellurium. The research center has done extensive work on the semiconductor properties of selenium and compounds of selenium and tellurium. In addition, Battelle has conducted such studies involving selenium as those on its use as a petroleum additive and as an agricultural chemical.

Corporations represented on the Selenium and Tellurium Development Committee include: American Metal Climax, Inc.; The Anaconda Company; Cerro de Pasco Corporation; the International Nickel Company, Inc.; Kennecott Copper Corporation; Noranda Mines Limited; Phelps Dodge Refining Corporation; and United States Smelting, Refining, and Mining Company.

* SCUFFING STUDY BY REPLICAS

The search for a better understanding of what causes scuffing in engine cylinders has led to the use of plastic replicas for following the progress of wear in engine cylinders. To make replicas of engine cylinder walls, scientists at Battelle removed the engine head at set intervals and lowered the pistons. Replicas were made by dipping sheets of cellulose acetate in dioxane and pressing them against the cylinder walls. Refinements in the basic technique made it possible to obtain replicas almost completely free of bubbles and other defects. A thin layer of gold was evaporated on replicas of particular interest to enhance reflectivity and contrast when they were examined under the light microscope.

The engine being studied was run under increasingly severe conditions until scuffing occurred. Since the series of replicas provided a graphic history of the cylinder surfaces during the engine run, microscopists were able to view in retrospect the areas in which scuffing occurred. The same areas on replicas made after successive steps were located by matching the honing patterns that recurred in each replica taken.

A. P. Young, the Battelle microscopist who conceived the idea, said that replicas for light microscopy have at least two advantages over conventional light microscope techniques: (1) Replicas can be used for microscopic examination of surfaces inaccessible because of size or shape to direct. (2) A series of replicas taken at stages during a test constitutes a graphic history of the sample being studied. This method of examination may be used not only to investigate wear but any problem in which the origin of surface features, such as fatigue cracks, is of interest.

* PIN-TUBE RECORDER

The developments in the field of high-speed communication have created a need for high-speed recording equipment. Studies of the problem have made it clear that systems utilizing an electron beam give a distinct advantage to cathode-ray tube over the mechanical systems because of the absence of mechanical inertia in the former. An effective method for recording the electrical charges in the beam of a cathode-ray tube has been developed at Battelle in research sponsored by, and in association with, HALOID XEROX INC and Wright Air Development Center.

The method involves the utilization of a pin-induction technique by which a pin-type cathode-ray tube is used to direct an electron beam into a rugged, electrically insulating film. The beam produces an electrostatic image which is then processed into a visible image by xerography. In xerography, an electrostatic-charge image is made visible by the application of small, charged powder particles, which arrange themselves according to electrostatic pattern.

Battelle physicists Harvey H. Hunter, Osmar A. Ullrich, and Lewis E. Walkup point out that though the development has not been fully evolved, the results already obtained are most promising and indicate the feasibility of such a recording system for producing images of good quality and high resolution. It appears that a modest research effort could yield a superior recorder.

Such a xerographic recorder would be relatively unaffected by nuclear radiations; it would be operable over a wide range; and since the electron beam has virtually no inertia, the frequency response could be high.

* REPORTING REACTOR PROGRESS

A series of new publications, under the general title *Technical Progress Review,* is being issued under the auspices of the U. S. Atomic Energy Commission. Designed to aid interested organizations and persons in keeping abreast of reactor developments, the quarterly publications, as their titles indicate, contain summaries of recent technical advances in the following fields: *Power Reactor Technology; Reactor Fuel Processing;* and *Reactor Core Materials.*

Information in these reviews is compiled from papers, reports, and other publications dealing with research and development activities associated with

nuclear reactors. Abstracts on each subject are correlated in special sections, with emphasis placed upon noteworthy accomplishments and significance rather than on details of results. Bibliographies are supplied for each subject.

The issues on *Power Reactor Technology* are prepared by General Nuclear Engineering Corporation, with W. H. Zinn serving as editor. *Reactor Fuel Processing* issues are prepared by Argonne National Laboratory under the guidance of S. Lawroski. *Reactor Core Materials* issues are prepared by Battelle staff members under the guidance of Russell W. Dayton and Eugene M. Simons.

Each publication is available at $2 per year through the U. S. Government Printing Office, Washington 25, D. C.

* URANIUM RECOVERY EQUIPMENT

The recovery of uranium from spent power-reactor fuel elements is a problem of considerable difficulty. A number of recovery processes are now under study at AEC laboratories. Of these, the processes which have been given the names Zircex and Darex are among the techniques being currently developed by the Chemical Technology Division of the Oak Ridge National Laboratory. These two processes make uranium available in a nitrate solution which is suitable for solvent extraction by conventional means. However, corrosion-resistant materials must be found for constructing the required equipment.

A corrosion-evaluation study of possible construction materials for use in connection with the Zircex and Darex processes has been under way at Battelle. Institute technologists Charles L. Peterson, Paul D. Miller, Earl L. White, and Walter E. Clark report that a feasible material for a single Zircex unit is not now apparent. However, if that recovery process for fuel elements containing zirconium is run in two steps, there is evidence that materials may be available for constructing the equipment to handle each step separately. Thus, Inconel, Haynes 25, Type S-816, Illium R, and Hastelloy B appear promising for the hydrochlorinator, while the container for the second step could be constructed of titanium or tantalum.

The Battelle study indicates that several materials appear promising for use in the equipment for the Darex process for handling fuel elements containing stainless steel. Titanium, Haynes 21, and Type S-816, in that order, appear least subject to corrosion in the Darex dissolver unit.

* CERAMIC-COATED WIRE

The trend in the electrical industry has been toward development of equipment to operate at higher temperatures. Operating temperatures are rapidly approaching the limit for present organic insulating materials in both military and industrial equipment.

To meet the demand for greater heat resistance in wire, scientists working at Battelle and at the General Electric Company's Fort Wayne Laboratory have developed a flexible ceramic-coated copper wire. A report of the development was presented at the recent Pittsburgh meeting of the American Chemical Society. The authors of the paper describing the combined research effort were Burnham W. King, George D. Kelly, and Winston H. Duckworth of Battelle, and Jack H. Terry of General Electric.

Using evaluation methods that are standard in the electrical industry, the authors concluded that the new ceramic-coated wire compares favorably with present commercial-type wire insulated with organic coatings. Moreover, it possesses the greater heat resistance needed in a growing number of industrial and military applications.

The new development is now undergoing pilot-plant evaluation. The porcelain enamel-coated wire can be produced on a continuous production-line basis by firing it in a controlled-atmosphere furnace.

* Will thermoelectric generators operating thermally in series perform more efficiently than single-stage generators? From calculations made with bismuth-telluride alloys and lead-telluride alloys, Battelle's Ted C. Harman found that higher efficiencies can be obtained by using a combination of the two materials in a two-stage generator. The two-stage was more efficient than a single-stage generator using either of the alloys. He concludes that the calculations could be applied to any number of generators thermally in series. Since the individual-stage efficiencies are approximately additive, a large increase in over-all generator efficiency is anticipated through the use of multiple stages.

Writings by STAFF Members

Electrochemical Society, Journal, v. 105, April 1958, contains the following articles by staff members:

Equilibria in the Niobium-Hydrogen Systems. W. M. Albrecht, M. W. Mallett, and W. D. Goode, pp. 219-223.

Equilibria in the niobium-hydrogen system were determined in the range 100-900 C, 10-1000 mm of mercury hydrogen pressure, and atomic ratios of hydrogen to niobium of 0.01-0.85. A single phase solid solution of hydrogen in niobium was produced throughout most of the system. In no region did the equilibrium solubility exactly follow a simple pressure dependency. The heat of solution increased with hydrogen content, which behavior may be related to an expansion in the niobium lattice.

An Investigation of Some New Cathode Depolarizer Materials. A. B. Tripler, Jr., and L. D. McGraw, pp. 179-183.

The electrochemical characteristics of $MnPO_4$, $BaFe_4$, and chloranil were investigated. The first two furnish cathodes which can be discharged at 200 ma/in.^{2} without severe polarization. Maximum nonpolarizing currents for the $MnPO_4$ are discussed in terms of the surface area of carbon admixed with it to form cathodes.

Engineers Joint Council, Nuclear Engineering & Science Conference, Preprints, 1958, contain the following papers by staff members:

Corrosion Screening of Component Materials for NaK Heat Exchange Systems. Samuel J. Bashman, John H. Stang, and Eugene M. Simons, *Preprint 24*, 25 pp.

Sixty-one materials which might be useful for special components, such as valve-seat inserts, valve plugs, shaft-seal facings, and bearings, in high-temperature NaK flow systems were screened in tilting-furnace corrosion experiments. These include high-temperature alloys, pure metals, cermets, and ceramics. The standard test consisted of confining a specimen to the hot end of a sealed Inconel X capsule partially filled with NaK and exposing the capsule for 110 hr. (5,000 cycles) in a tilting furnace. The hot end of the capsule was controlled at 1600 F, while the cold end was 1200 F. Post-test corrosion evaluations were based on metallographic examinations of the specimens, specimen weight change measurements, capsule wall examinations, and specimen surface-roughness changes.

A Study of Aluminum-Uranium Alloys Containing Up to 45 wt.% Uranium. Norman E. Daniel, Ellis L. Foster, and R. F. Dickerson, *Preprint 31*, 14 pp.

Many of the properties possessed by high-uranium alloys are comparable to those exhibited by a 16 wt.% uranium alloy. Melting and casting studies showed that acceptable castings of aluminum-uranium alloys with high-uranium contents can be produced by a single melting technique. Fabricability and corrosion resistance of the alloys were studied.

Members of the Battelle staff are authors of the recently published articles and books listed on these pages. In most cases, reprints are available from the Battelle Publications Office, 505 King Avenue, Columbus 1, Ohio.

A Study of the Feasibility of a Tracer System for Locating a Fuel-Element Failure in a Pressurized Water Reactor. Meyer Pobereskin, Duane N. Sunderman, Aaron Eldridge, George D. Calkins, and Walston Chubb, *Preprint 140*, 31 pp.

The proposed method consists in adding small amounts of different pairs of elements to the fuel alloy of each subassembly. These elements become activated during operation of the reactor, producing radioisotopes. When a fuel-element failure has occurred, a portion of the coolant is analyzed radiochemically for the elements added to the fuel as tracers. The radioactive species of the elements that are detected indicate the subassembly in which the failure has occurred. Suitable tracer elements include Er, Ga, Ho, Ir, Pt, Os, Re, Sc, Tb, Tm, Yb.

Comparison of the Active With the Inactive Uranium Dioxide-Oxygen System. D. A. Vaughan and R. K. Willardson. *Preprint 13*, 15 pp.

Structural studies of the UO_x-oxygen systems for active and inactive UO_2 revealed little or no difference for compositions below $UO_{2.25}$. However, for compositions above $UO_{2.25}$, the active oxide oxidized to a product which has less lattice distortion than the oxidation product of the inactive oxide. Electrical properties and lattice parameters were studied.

Ultrasonic Atomization of Liquids. John N. Antonevich. Paper from "Proceedings of the National Electronics Conference. 1957". v. 13. pp. 798-807. 1958. National Electronics Conference, Inc., Chicago.

Observations of liquid films excited ultrasonically are discussed. The rupture of capillary waves in the film is suggested as the prime cause of atomization. The atomization of a paint film by 20-kc vibrations was studied qualitatively. High-speed motion pictures show sprays emanating from vibrating gas bubbles. The particles produced were from 5 to 500 μ in diameter. Under the best atomizing conditions at 20 kc, the particle diameters were 20 to 70 μ.

Research and Development. John S. Crout and Robert E. Greenlee. Paper from "Production Handbook". 2nd Edition. 31 pp. 1958. The Ronald Press, New York.

The various types of research are discussed along with an analysis of the function of research in industry. Both company-operated and independent research facilities are described. Gives proeedures for the major phases of a research program including program initiation, manpower and equipment requirements, effective use of staff, organization, management control, and surveillance, budgeting, and evaluation and control of results.

Remote Metallography Practices at Battelle's Hot-Cell Facility. A. W. Hare, A. A. Bauer, and R. F. Dickerson. Paper from "1958 Nuclear Congress. Sixth Hot Laboratories and Equipment Conference, March 19-21, 1958". pp. 232-236. 1958. American Institute of Chemical Engineers, New York.

Techniques and equipment for preparing radioactive metallographic specimens are described and some results illustrated. Efficiency may be greatly increased by use of vibratory grinding and polishing machines.

Heat Transfer From Parallel Rods in Axial Flow. D. A. Dingee and J. W. Chastain. *U. S. Atomic Energy Commission*, TID-7529 (Pt. 1, Book 2) November 1957, pp. 462-501.

Local convective heat transfer coefficients are presented for heated rod clusters in axial water flow. Three ratios of center-to-center spacing to rod diameters, 1.12, 1.20, and 1.27, in both a square and triangular lattice array were tested. The tests were run at two Prandtl numbers, 1.18 and 1.75, over a range of Reynolds numbers between 104 and 106.

The Thermal Stability of Copper Phthalocyanine. Emil A. Lawton. *Journal of Physical Chemistry*, v. 62, March 1958, p. 384.

The stability of copper phthalocyanine for one hour at 800 C in a closed system contrasts with the total decomposition of similar polymeric materials at 700 C under continuous pumping. This stability is attributed to a very slow rate of decomposition and is not a measure of the intrinsic thermal stability of this compound.

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***Asterisks mark items that may be used in the Battelle Library only. None of the unbound materials listed below are available for interlibrary loan.**

AERONAUTICAL ENGINEERING

7708 Calculations by the Method of Characteristics. R. D. Linnell. *Aeronautical Engineering Review*, v. 17, Mar. 1958, p. 39-44.

A high-speed electronic computer program for calculation of axially symmetric flow around bodies of revolution by the method of characteristics.

7709* Compressor-Turbine Matching of Two-Spool Turbo-Props. A. W. Morley. *Aeronautical Quarterly*, v. 9, Feb. 1958, p. 17-33.

The problem of the best division of pressure ratio between the two spools is investigated by means of simplified expressions for component characteristics.

7710* The Wave Drag of Wing-Quasi-Cylinder Combinations at Zero Incidence. L. E. Fraenkel. *Aeronautical Quarterly*, v. 9, Feb. 1958, p. 55-70.

Deals with the drag, at zero lift, of wing-body combinations which are symmetrical about the wing plane.

7711 AGARD Second Guided Missiles Seminar. Guidance and Control. 391 pp. 1956. North Atlantic Treaty Organization, Advisory Group for Aeronautical Research and Development, Washington, D. C. (UG630 N81.1a)

These 24 papers consider the range of problems from the selection of a missile guidance and control system to its final testing in actual flight.

7712 Jet Drag of Wings With Jet Flaps. P. R. Payne. *Aircraft Engineering*, v. 30, Mar. 1958, p. 73-81.

An examination of Stratford's theory of jet drag.

7713 Some Effects of Kinetic Heating on the Stiffness of Thin Wings. II. Analysis of Flexural and Torsional Stiffnesses for Large Deformations of Thin Solid Wings. S. L. Kochanski and J. H. Argyris. *Aircraft Engineering*, v. 30, Mar. 1958, p. 82-85.

Approximate analysis for large deformations of symmetrical double-wedge wings. (To be continued.)

7714 (French.) Experimental Study of the Turbulent Flow in a Two-Dimensional Divergent Flow of Air. **Étude expérimentale de l'écoulement turbulent dans un divergent bidimensionnel parcouru par de l'air.** Jean-Pierre Milliat. *France. Ministère de l'Air, Publications Scientifiques et Techniques*, no. 335, 1957, 134 pp. (TL502 F84.1p Vis.)

The angle of divergence was 2, 4, or 6°. A hot wire anemometer measured average velocities and their fluctuations. A regime of equilibrium, in the downstream area of divergence occurred after a transition zone upstream.

7715 (French.) Study of Hypersustentation and Decrease of the Resistance to Propulsion. **Étude sur l'hypersustentation et la diminution de la résistance a l'avancement.** Dimitri Riabouchinsky. *France. Ministère de l'Air, Publications Scientifiques et Techniques*, no. 337, 1957, 134 pp. (TL502 F84.1p Vis.)

Historical survey and analysis of investigations. Boundary layer. Friction in fluids. Rotation of disks in viscous fluids. Production of whirls in fluids of low kinematic viscosity. Undulatory resistance.

7716 On Two Dimensional Panel Flutter. Y. C. Fung. *Journal of the Aeronautical Sciences*, v. 25, Mar. 1958, p. 145-160.

Any relief of the compressive load in the plate, will be beneficial to the prevention of flutter. An approximate method is given for calculating the limiting form and amplitude of flutter motion.

7717 Incompressible Two-Dimensional Stagnation-Point Flow of an Electrically Conducting Viscous Fluid in the Presence of a Magnetic Field. Joseph L. Neuringer and William McIlroy. *Journal of the Aeronautical Sciences*, v. 25, Mar. 1958, p. 194-198.

Analysis of the hydromagnetic interaction indicates the possibility of reducing the skin friction of a high speed re-entry missile with reasonable values of the applied magnetic intensity and electrical conductivity of the fluid.

7718* Trajectory Determination of a Supersonic Body by Acoustical Observations. G. V. Groves. *Journal of Atmospheric and Terrestrial Physics*, v. 12, no. 1, 1958, p. 17-25.

A theory is developed for deriving the trajectory of a body moving at supersonic speeds through the atmosphere from observations on the times of arrival of its shock wave at a number of microphones at known points on the ground, wind and temperature effects being taken into account.

7719 1958 Missile Materials Review. Alfred J. Zaehringer and Raymond M. Nolan. *Missiles and Rockets*, v. 3, no. 3, Mar. 1958, p. 69-75.

A report on industry use and development of present and future materials, including metals, plastics, coatings, lubricants, and radiation shielding substances.

7720* On the Deflection of Jets by Aerofoils. L. C. Woods. *Quarterly Journal of Mechanics and Applied Mathematics*, v. 11, Feb. 1958, p. 24-38.

A two-dimensional jet of incompressible, inviscid fluid is deflected by an aerofoil immersed in it. The relation between the aerofoil incidence and jet deflection angle, and other characteristics are calculated.

7721* (French.) Heat Problems Raised by Higher Speeds of Planes. Physical and Mechanical Testing Methods for Light-Weight Materials. **Problèmes thermiques posés par l'augmentation de la vitesse des avions. Méthodes d'essais physiques et mécaniques des matières allégées.** B. Persoz. *Revue Générale du Caoutchouc*, v. 35, no. 1, Jan. 1958, p. 41-47.

Light-weight materials play a part in plane construction in order to limit the heat flux to the inside of the plane, while sharing in the over-all stiffness and vibration damping. For these reasons such materials should be studied both from thermal and mechanical angles.

7722 Handbook of Supersonic Aerodynamics. *U. S. Department of the Navy, Bureau of Ordnance NAVORD Report No.* 1488, v. 3, June 1957, not paged. (TL570 Un3.55n Contin.)

Data pertaining to two-dimensional airfoils, covering methods for determining pressure coefficients; lift, drag, and center of pressure; symmetrical and unsymmetrical airfoil sections and viscosity effects.

7723* (German.) Comparison of the Theoretical and Experimental Drag Coefficients in Sonic and Supersonic Flow. **Vergleich der theoretischen und experimentellen Widerstandsbeiwerte im Schall- und Überschallgebiet.** Dietrich Fiecke. *Zeitschrift für Flugwissenschaften*, v. 6, no. 2, Feb. 1958, p. 36-47.

Drag coefficients obtained from measurements on various shapes of wings and bodies in sonic and supersonic flow are compared with values obtained from linearized supersonic flow theory. A first attempt to estimate the approximate change of drag with Mach number.

7724* (German.) Application of Electronic Digital Computers to the Solution of Problems of Flight Dynamics. **Anwendung elektronischer Digitalrechner zur Lösung flugmechanischer Probleme.** Werner Niemz. *Zeitschrift für Flugwissenschaften*, v. 6, no. 2, Feb. 1958, p. 47-52.

Computing programs are explained in brief. The advantage of the order sequence in these programs is shown in comparison with earlier work. Experience in applying electronic computers.

7725* (English.) **Generalized Variational Approach to the Optimum Thrust Programming for the Vertical Flight of a Rocket. I. Necessary Conditions for the Extremum.** Angelo Miele. *Zeitschrift für Flugwissenschaften*, v. 6, no. 3, Mar. 1958, p. 69-77.

The vertical flight of a rocket is analyzed in connection with the problem of determining the burning program which minimizes an arbitrary function of the final values of time, mass, altitude, and velocity. Closed form solutions are developed for three particular cases: flight in a vacuum, flight in a uniform atmosphere, and flight in an isothermal atmosphere.

See also: **8184** (computers for aircraft industry); **8357** (rocket propellant); **8360** (bibliography of space literature); **8439** (tool steels for aircraft); **8443** (steel for aircraft and missiles); **8448** (tool steels for aircraft and missiles); **9002** (open cycle refrigeration system).

AGRICULTURE

7726* Accumulation of DDT in the Soil of an Ontario Peach Orchard. D. C. Herne and D. Chisholm. *Canadian Journal of Soil Science*, v. 38, no. 1, Feb. 1958, p. 23-26.

Run-off from the foliage at the time of spraying was an important factor in the rate of DDT accumulation. Approximately 95% of the accumulated insecticide was retained in the cultivated layer, and the amounts near the trunks of the trees were significantly greater than those under the peripheries of the trees or midway between adjacent trees.

7727 Cation Adsorption and Forest Fertilization. W. H. Hinson and E. R. C. Reynolds. *Chemistry & Industry*, 1958, no. 7, Feb. 15, p. 194-196.

Discusses whether the common soluble fertilizers are the most suitable materials to employ in forest fertilization.

7728 Some General Principles in Ammoniation and Granulation. Richard D. Taylor. *Farm Chemicals*, v. 121, Mar. 1958, p. 29-31.

7729 Effect of Certain Herbicides on Rate of Nitrification and Carbon Dioxide Evolution in Soil. R. W. Teater, J. L. Mortensen, and P. F. Pratt. *Journal of Agricultural and Food Chemistry*, v. 6, Mar. 1958, p. 214-216.

This study was undertaken to determine the effects of α-chloro-*N*,*N*-diethylacetamide, 2-chloroallyl diethyldithiocarbamate, isopropyl-*N*-(3-chlorophenyl) carbamate, and an amine salt of 2,4-D on microbial activity in an incubated soil.

7730 Spot Chromatography Identification of Citrus Rootstocks. Raymond M. Selle. *Nature*, v. 181, Feb. 15, 1958, p. 506-507.

The method compares the spots made on filter paper by drops of extracts of unknown roots with similar spots made from known varieties.

7731* Retention and Fixation of Ammonia by Soils. Jerome B. Sohn and Michael Peech. *Soil Science*, v. 85, no. 1, Jan. 1958, p. 1-9.

The capacity of the soil to sorb ammonia could be attributed to neutralization of the exchangeable hydronium and aluminum ions as well as to the formation of organic nitrogen compounds upon autoxidation of soil organic matter and simultaneous ammonia fixation.

See also: **7985** (physicochemistry of starches); **8973** (utilization of urban-type organic wastes).

BIOCHEMISTRY AND BIOPHYSICS

7732 Interactions of Amino Acids With Deoxyribonucleic Acid (DNA). Christine D. Jardetzky. *American Chemical Society, Journal*, v. 80, Mar. 5, 1958, p. 1125-1127.

A study of the binding of various amino acids to DNA was conducted using the technique of equilibrium dialysis. Only the basic amino acids and peptides were found to interact with DNA in solutions of low ionic strength. An approximate binding constant was derived from the data after applying a correction for the Donnan effect.

7733 Nucleoside Polyphosphates. VI. An Improved and General Method for the Synthesis of Ribo- and Deoxyribonucleoside 5'-Triphosphates. Michael Smith and H. G. Khorana. *American Chemical Society, Journal*, v. 80, Mar. 5, 1958, p. 1141-1145.

A generally satisfactory procedure for the synthesis of ribo- and deoxyribonucleoside 5'-triphosphates is described. The method involves the reaction of tri-*n*-butylammonium salts of nucleoside 5'-monophosphates and orthophosphoric acid with dicyclohexylcarbodiimide.

7734 Medicine and the Aging Population. William H. Lewis, Jr. *American Medical Association, Journal*, v. 166, no. 12, Mar. 22, 1958, p. 1412-1419.

7735* Studies in Metabolic Spectra. I. Mode of Action of Tetracycline Antibiotics. J. F. Snell, Florence Z. Thanassi, and Dorothy Ann Sypowicz. *Antibiotics & Chemotherapy*, v. 8, Feb. 1958, p. 57-75.

The studies reported indicated the accumulation of three compounds in oxytetracycline-inhibited *E. coli* 21 cells that are labelled by 2-C^{14} acetate, and one that is labelled by orthophosphate: the suppression of two compounds labelled by 2-C^{14} acetate in oxytetracycline-inhibited *E. coli* 21T; and differences in the mode of action of the broad-spectrum antibiotics on the phosphorus metabolism of *E. coli* 21.

7736* A *Neurospora* Plate Method for Testing Antimetabolites. Robert Fuerst and Winifred M. Skellenger. *Antibiotics & Chemotherapy*, v. 8, Feb. 1958, p. 76-80.

An agar plate method, used for testing the requirements of mutants, has been successfully adapted to assays for inhibition effects of antimetabolites on growth of *Neurospora crassa*. The method was found suitable for testing quantitative relationships between inhibitors and substances that may be used to block the inhibition effect.

7737* On the Mechanism of Metal Activation of Deoxyribonuclease I. John S. Wiberg. *Archives of Biochemistry and Biophysics*, v. 73, no. 2, Feb. 1958, p. 337-358.

The activation of deoxyribonuclease I (DNaseI) by Mg^{++}, Mn^{++}, and Ca^{++} has been studied at 27 C., at an ionic strength of 0.15, and at a pH of 7.5-7.2. Alone, the metals rank as activators in the order $Mn^{++} > Mg^{++} > Ca^{++}$. Activity in the presence of Mg^{++} or Mn^{++} has been shown to require the formation of a "metallosubstrate."

7738* The Inhibition of Ribonuclease by Acidic Polymers and Their Use as Possible Antiviral Agents. Hans Heymann, Z. R. Gulick, C. J. DeBoer, G. de Stevens, and R. L. Mayer. *Archives of Biochemistry and Biophysics*, v. 73, no. 2, Feb. 1958, p. 366-383.

A number of the highly active RNase inhibitors have antiinfluenza and antivaccinia activities in eggs. The possible relationship between anti-RNase activity and virus inhibition in embryonated eggs is discussed.

7739* The Microdetermination of Ribonuclease. J. C. Houck. *Archives of Biochemistry and Biophysics*, v. 73, no. 2, Feb. 1958, p. 384-390.

A solution of ribonucleic acid when mixed at 37 C with a solution containing serum albumin and gelatin gives a turbidity which may be measured at 400 mμ. The decrease in this turbidity with enzyme action permits the quantitative estimation of 1-50 mμg. of crystalline ribonuclease.

7740* Antibiotic Compounds With Action Against Bacterial Viruses: Neohydroxyaspergillic Acid. Ulrich Weiss, Frieda Strelitz, Helen Flon, and Igor N. Asheshov. *Archives of Biochemistry and Biophysics*, v. 74, no. 1, Mar. 1958, p. 150-157.

Cultures of a strain of *Aspergillus sclerotiorum* yielded a new antibiotic, neohydroxyaspergillic acid, active against some bacteriophages. The substance was isolated in pure form and found to be isomeric with hydroxyaspergillic acid.

7741* The Estimation of Protein Contamination in Ribonucleic Acid. L. K. Ramachandran and H. Fraenkel-Conrat. *Archives of Biochemistry and Biophysics*, v. 74, no. 1, Mar. 1958, p. 224-228.

The phenol reagent is shown to be suitable for determining the degree of protein contamination in ribonucleic acid (RNA) preparations derived from nucleoproteins and to offer the advantages of rapidity and the need for only small samples.

7742* (English.) **Effects of Azatryptophan on Bacterial Enzymes and Bacteriophage.** Arthur B. Pardee and Louise S. Prestidge. *Biochimica et Biophysica Acta*, v. 27, no. 2, Feb. 1958, p. 330-344.

The influence of a number of amino acid analogs on the ability of *Escherichia coli* to form proteins was investigated. Two enzymes, aspartate carbamyl transferase and D-serine deaminase, were formed in about half the maximal amounts in the presence of azatryptophan, but not when the tryptophan supply was limited by various other means.

7743* The Effects of Acute Protein Depletion on the Distribution of Radioiron in Rat Tissues. W. F. Bethard, R. W. Wissler, J. S. Thompson, M. A. Schroeder, and M. J. Robson. *Blood*, v. 13, Feb. 1958, p. 146-155.

In protein-deficient animals normal Fe^{59} time-concentration relationships were disrupted completely. Less iron was recovered from the tissues of protein-deficient rats than from normal animals.

7744* Effect of Indole Compounds on Vitamin B_{12} Utilization. Jerry Drexler. *Blood*, v. 13, Mar. 1958, p. 239-244.

Indole and indoleacetic acid are shown to inhibit the growth of a vitamin B_{12} dependent microorganism, a mutant strain of *Escherichia coli*. The mechanism of that inhibition may be a competitive inhibition of some enzymatic system necessary for the utilization of vitamin B_{12}.

7745 Some Constituents of the Urine of Normal and Schizophrenic Individuals. R. M. Acheson, Rachel M. Paul, and R. V. Tomlinson. *Canadian Journal of Biochemistry and Physiology*, v. 36, no. 3, Mar. 1958, p. 295-305.

7746 Control of Nuclear Processes by Auxin in Axillary Buds of *Tradescantia paludosa*. J. M. Naylor. *Canadian Journal of Botany*, v. 36, no. 2, Mar. 1958, p. 221-232 + 1 plate.

In axillary buds inhibited by the terminal bud, mitoses were absent in a group of cells constituting the initials of tunica and corpus within the apex.

7747* C-Reactive Protein in Cancer. A Study of 216 Patients. Liselotte Graf and Maurice M. Rapport. *Cancer*, v. 11, no. 2, Mar.-Apr. 1958, p. 255-258.

The results showed that a third of 216 patients did not have significant concentrations of CRP, and another third had very low concentrations (lowest tenth of the range). Many patients with metastases were without C-reactive protein.

7748* The Colorimetric Determination of Leucine Aminopeptidase in Urine and Serum of Normal Subjects and Patients With Cancer and Other Diseases. Julius A. Goldbarg and Alexander M. Rutenburg. *Cancer*, v. 11, no. 2, Mar.-Apr. 1958, p. 283-291.

The kinetics of the enzymes and their assay in normal subjects and in patients with cancer and other diseases are presented.

7749* A Study of the Serum Properdin Levels of Patients With Malignant Tumors. Antonio Rottino, Arthur L. Levy, and Alexander Conte. *Cancer*, v. 11, no. 2, Mar.-Apr. 1958, p. 351-356.

The amount of properdin in sera is found to decrease to less than 2 units per ml. in 45% of patients afflicted with cancer; this decrease occurs in only 22% of lymphoma patients, in 47% of patients with chronic degenerative disease such as arteriosclerosis, and in 5% of normal people. As a group, male cancer patients have lower serum properdin values than do female cancer patients.

7750* Penetration of Serum Globulins into Mouse Tumors. R. Hiramoto and W. J. Nungester. *Cancer Research*, v. 18, no. 1, Jan. 1958, p. 27-32.

Injection of I^{131}-tagged normal or immune globulin intravenously into mice bearing the Ehrlich tumor resulted in some increase in radioactivity in the tumor over that found in the spleen, liver, or kidney.

7751* Studies in a Tumor Spectrum. VII. The Effect of Antibiotics on the Growth of a Variety of Mouse, Rat, and Hamster Tumors. Kanematsu Sugiura, C. Chester Stock, H. Christine Reilly, and Miyono M. Schmid. *Cancer Research*, v. 18, no. 1, Jan. 1958, p. 66-77.

Penicillin, streptomycin, chlorotetracycline, chloramphenicol, and oxytetracycline had almost no inhibitory effect on any of the 22 solid tumors as well as three ascites tumors tested, with the exception of oxytetracycline, which had a moderate inhibitory effect.

7752* A Study of the Mechanisms of Polyploid Nuclei Formation Induced in Tadpoles by Carcinogen-Protein Conjugates. E. Marie Hearne Creech. *Cancer Research*, v. 18, no. 1, Jan. 1958, p. 78-93 + 4 plates.

7753* Effects of Carcinostatic and Other Biologically Active Compounds in the Normal Rat: Evaluation as a System for Cancer Chemotherapy Screening. Enrico Anglesio, Erich Hirschberg, and Alfred Gellhorn. *Cancer Research*, v. 18, no. 1, Jan. 1958, p. 113-116.

The peripheral leukocyte count, the mitotic activity of the small intestinal epithelium, and the bone marrow of normal Wistar rats have been examined. The response of these three normal biological systems differs significantly from that of experimental rodent tumors as a group and indicates that experimental tumors are the most reliable guide now available for the selection of potential anti-tumor drugs.

7754* Mixed Bacterial Toxins in the Treatment of Tumors. I. Methods of Preparation and Effects on Normal and Sarcoma 37-Bearing Mice. II. Gross and Microscopic Changes Produced in Sarcoma 37 and in Mouse Tissues. H. F. Havas, M. E. Groesbeck, and A. J. Donnelly. *Cancer Research*, v. 18, no. 2, Feb. 1958, p. 141-154 + 4 plates.

The mode of growth, as well as the bacterial strain, plays a determinant role in the ensuing oncolytic potency. Mixed bacterial toxins produced necrosis in Sarcoma 37. Toxins produced changes which included edema of cells, pyknosis of nuclei, shrinkage of cells, and cellular disintegration, with resulting hemorrhage and eventual sloughing of the tumor followed by healing and scar formation.

7755* Nucleic Acid Metabolism in Regenerating Rat Liver. V. Comparison of Results *in Vivo* and in Tissue Slices. Liselotte I. Hecht and Van R. Potter. *Cancer Research*, v. 18, no. 2, Feb. 1958, p. 186-192.

DNA labeling was minimal in tissue slices of normal liver and the increase in the rate of DNA labeling observed during liver regeneration *in vivo*, which was previously equated with DNA synthesis, could be demonstrated in slices of regenerating liver.

7756 Synthesis in the Study of Nucleotides. Alexander Todd. *Chemistry & Industry*, 1958, no. 7, Feb. 15, p. 170-176.

A two-stage process; the first is formation of the cyclic phosphate with simultaneous expulsion of the group R, and the second the hydrolysis of the cyclic phosphate in either of two ways to give a mixture of nucleotides.

7757* (Russian.) Biochemical Mutants of *Staphylococcus* With a Damaged Oxidation as Testing Object in Anti-Cancer Antibiotics Investigation. **Biokhimicheskie mutanty stafilokokkov s povrezhdennym okisleniem kak test-ob'ekty pri izyskaniiakh protivorakovykh antibiotikov.** G. F. Gauze, G. V. Kochetkova, and G. B. Vladimirova. *Doklady Akademii Nauk SSSR*, v. 117, no. 4, Dec. 1, 1957, p. 720-722.

Comparison of antibiotics.

7758* Submicroscopic Structure of Meiotic Chromosomes During Prophase. J. R. Sotelo and O. Trujillo-Cenóz. *Experimental Cell Research*, v. 14, no. 1, Feb. 1958, p. 1-8.

The existence of well differentiated structures in prophasic nuclei of rat primary spermatocytes has been demonstrated. These structures consist of ribbon-like groups of three threads; two external thick and dense (500 Å wide); one medial thin and light (120 Å wide).

7759* A Simple Plastic Perfusion Chamber for Continuous Maintenance and Cinematography of Tissue Cultures. B. L. Toy and W. A. Bardawil. *Experimental Cell Research*, v. 14, no. 1, Feb. 1958, p. 97-103.

A simple and inexpensive laminated plastic perfusion chamber has been developed for tissue culture applications, with emphasis on time-lapse cinematography.

7760* (French.) Role of Amino Acids in the Synthesis of Nucleic Acids in *Escherichia coli*. **Rôle des acides amines dans la synthèse des acides nucléiques chez *escherichia coli*.** F. Gros and Françosie Gros. *Experimental Cell Research*, v. 14, no. 1, Feb. 1958, p. 104-131.

Amino acid auxotrophs of *E. coli*, after starvation for their growth factor, do not synthesize nucleic acid. The RNA synthesis can be restored if the essential amino acid is added again.

7761* Hormonal Influence on the Nucleic Acid and Protein Contents of the Human Myometrium. S. Brody. *Experimental Cell Research*, v. 14, no. 1, Feb. 1958, p. 149-159.

The protein and nucleic acid contents in human myometrium from women in the post-menopausal period, from non-pregnant women with ovarian function, and from pregnant women at different stages of pregnancy have been determined.

7762* Studies on Production of Hyaluronic Acid in Tissue Culture. The Presence of Hyaluronidase in Embryo Extract. H. Grossfeld. *Experimental Cell Research*, v. 14, no. 1, Feb. 1958, p. 213-216.

The formation of a tight mucin clot with acetic acid that can be prevented by hyaluronidase, indicates the presence of highly polymerized hyaluronic acid. Cultured cells of various mesenchymal tissues produce *in vitro* highly polymerized hyaluronic acid.

7763 Antigen-Antibody Reactions in Gel Single Diffusion: Theoretical Considerations. J. A. Spiers. *Faraday Society, Transactions*, v. 54, pt. 2, Feb. 1958, p. 287-295.

The effect on the diffusion process of antigen-antibody combination. An expression is derived for the motion of the precipitation zone for all antigen-antibody concentration ratios. By means of this expression, diffusion coefficients of individual antigens and their corresponding antibodies can be determined.

7764* The Correlation Effect for a Histidine Locus of *Neurospora crassa*. Ernst Freese. *Genetics*, v. 42, no. 6, Nov. 1957, p. 671-684.

A genetic study involving three closely linked histidine-requiring mutants and three other linked markers has been undertaken. Histidine-independent heterocaryons between any two histidine mutants have not been found. Events occurring in small regions of intimate pairing and resulting in the observed correlation effect seem not to involve mutation-like phenomena but rather the insertion of chromosomal pieces, replicated along one parent, into the homologous chromatid.

7765 Some Requirements of Biological Nitrogen Fixation. James E. Carnahan and John E. Castle. *Journal of Bacteriology*, v. 75, no. 2, Feb. 1958, p. 121-124.

Clostridium pasteurianum requires both iron salts and biotin for nitrogen fixation.

7766 Protoplasts and L-Type Growth of *Escherichia Coli*. Joshua Lederberg and Jacqueline St. Clair. *Journal of Bacteriology*, v. 75, no. 2, Feb. 1958, p. 143-160.

Observations support the proposals that: the mechanism of action of penicillin is to inhibit the synthesis of the bacterial cell wall; that the L forms of Dienes and Klieneberger are colonies of protoplasts, whose aberrant mode of growth is conditioned by the loss of the wall and the failure of the normal division mechanism.

7767 Polyphosphate as Accumulator of Phosphorus and Energy. Stuart Mudd, Akira Yoshida, and Masaatsu Koike. *Journal of Bacteriology*, v. 75, no. 2, Feb. 1958, p. 224-235.

In mycobacterial cells under resting conditions, polyphosphate decreases in the presence of glucose and increases in the presence of malate as oxidizable substrate.

7768* Vitamin B_{12} and Protein Biosynthesis. IV. In Vivo and in Vitro Studies. Shreepad R. Wagle, Ranjan Mehta, and B. Connor Johnson. *Journal of Biological Chemistry*, v. 230, Jan. 1958, p. 137-147.

B_{12} deficiency markedly reduced ability to incorporate labeled glucose, serine, methionine, alanine, and phenylalanine into protein.

7769* Studies on the Mode of Action of the Adrenocorticotropic Hormone. Seymour B. Koritz and Fernand G. Péron. *Journal of Biological Chemistry*, v. 230, Jan. 1958, p. 343-352.

Adrenal tissue which is stimulated *in vitro* by adreno-corticotropic hormone (ACTH) has been found to respond with an increased corticoid output to triphosphopyridine nucleotide (TPN+) in the presence of various substrates which should result in the formation of reduced TPN+ (TPNH).

7770* The Isolation in Tissue Culture, Chick Embryo and Suckling Mice of Filtrable Agents From Healthy Dairy Cattle. Calvin M. Kunin and Elva Minuse. *Journal of Immunology*, v. 80, no. 1, Jan. 1958, p. 1-11.

Evidence has been presented that the filtrable agents are viral in nature, serologically similar, fairly widespread in the cattle population, and probably of little importance in human disease.

7771* Adsorption, Multiplication, and Cytopathogenicity of Enteroviruses (Poliomyelitis, Coxsackie, and Echo Groups) in Susceptible and Resistant Monkey Kidney Cells. G. D. Hsiung and Joseph L. Melnick. *Journal of Immunology*, v. 80, no. 1, Jan. 1958, p. 45-52.

Indicates that the greater number of poliovirus plaques appearing on *Erythrocebus patas* monolayer was due to cell susceptibility rather than to differences of adsorptive capacity among the virus particles.

7772* Environmental Penicillin and Penicillin-Resistant *Staphylococcus aureus*. J. C. Gould. *Lancet*, v. 1, Mar. 8, 1958, p. 489-493.

Environmental penicillin is an important factor in the colonisation of hospital nasal carriers with penicillin-resistant *Staph. aureus*.

7773* Effects of Linolenic and Stearic Acids on Cholesterol-Induced Lipoid Deposition in Human Aortic Cells in Tissure-Culture. David D. Rutstein, Estelle Fasolino Ingenito,

John M. Craig, and Marcello Martinelli. *Lancet*, v. 1, Mar. 15, 1958, p. 545-552.

In tissue cultures of human aortic cells, deposition of lipoid can be induced by cholesterol, is reversible, can be inhibited by an unsaturated fatty acid (linolenic acid), and can be potentiated by the corresponding saturated fatty acid (stearic acid).

7774 Transformation of Megaloblasts to Normoblasts by Cultivating Human Bone Marrow in Presence of Vitamin B_{12} and Vitamin B_{12}-Binding Protein. I. Pendl and W. Franz. *Nature*, v. 181, Feb. 15, 1958, p. 488-489.

The effective principle in the conversion of megaloblastic marrow to normoblastic marrow is the vitamin B_{12}-binding protein.

7775 Prolongation of the Life of *Drosophila subobscura* by a Brief Exposure of Adults to a High Temperature. J. Maynard Smith. *Nature*, v. 181, Feb. 15, 1958, p. 496-497.

Life-span at 20 C can be increased by exposing adults to 30.5 C soon after emergence. At least two separate processes of senescence can occur in *Drosophila*.

7776 Formation of Two- and Three-Stranded Helical Molecules by Polyinosinic Acid and Polyadenylic Acid. Alexander Rich. *Nature*, v. 181, Feb. 22, 1958, p. 521-525.

Mixtures of polynucleotides are capable of forming hydrogen-bonded helical structures which are susceptible to crystallographic analysis.

7777 Enzymic Synthesis of Coenzyme I in Relation to Chemical Control of Cell Growth. R. K. Morton. *Nature*, v. 181, Feb. 22, 1958, p. 540-542.

7778 A Theory of Antibody Formation Involving Eosinophils and Reticuloendothelial Cells. Robert S. Speirs. *Nature*, v. 181, Mar. 8, 1958, p. 681-682.

7779 Lymphotrophic Antibiotics. P. Málek, M. Herold, J. Hoffman, and J. Kolc. *Nature*, v. 181, Mar. 8, 1958, p. 706-707.

The question of colloidal vs. crystalloid preparations of antibiotics was examined.

7780* The Breakage of *Tradescantia* Chromatids by Ionizing Radiations. John Read. *Physics in Medicine and Biology*, v. 2, no. 3, Jan. 1958, p. 258-270.

Lea's theory of the breakage of *Tradescantia* chromatids by ionizing radiations is discussed with particular regard to the unexpected efficiency of γ-radiation.

7781* Oxidative Phosphorylation and Functional Cytochromes in Skunk Cabbage Mitochondria. David P. Hackett and Darrell W. Haas. *Plant Physiology*, v. 33, no. 1, Jan. 1958, p. 27-32.

The mitochondrial fraction can couple the oxidation of α-ketoglutarate to the esterification of inorganic phosphate. This oxidative phosphorylation is as efficient as that shown with other plant and animal mitochondria.

7782 Occurrence of Unequal Amounts of Free Methionine in Male and Female *Drosophila melanogaster*. William D. Kaplan, Joseph T. Holden, and Benjamin Hochman. *Science*, v. 127, Feb. 28, 1958, p. 473-474.

Females contain twice the amount of free methionine found in males.

7783 The Search for Anticancer Antibiotics. G. F. Gause. *Science*, v. 127, Mar. 7, 1958, p. 506-508.

Discusses possibility of obtaining the equivalents of cancer cells in microbiology and using these biochemical mutants for the detection of new substances that selectively inhibit those specific features of cell metabolism which are characteristic of the malignant growth.

7784 Use of Arginine to Eliminate Medium Changes in Tissue Culture Systems. William J. Thomas, Donald W. Ziegler, Saul A. Schepartz, and William F. McLimans. *Science*, v. 127, Mar. 14, 1958, p. 591-592.

7785 Serotonin, Norepinephrine, and Related Compounds in Bananas. T. Phillip Waalkes, Albert Sjoerdsma, Cyrus R. Creveling, Herbert Weissbach, and Sidney Udenfriend. *Science*, v. 127, Mar. 21, 1958, p. 648-650.

7786* Sulfhydryl Groups in Resting and Stimulated Rat Brain; Their Relationship With Protein Structure. Georges Ungar and Dominick V. Romano. *Society for Experimental Biology and Medicine, Proceedings*, v. 97, Feb. 1958, p. 324-326.

Change in SH groups and side group ionization ratio is interpreted as an indication of structural rearrangement of certain proteins which may participate in the mechanism of excitation.

7787* Viability of Monkey Kidney Tissue Cultures Stored at 5°C. James G. Crawford. *Society for Experimental Biology and Medicine, Proceedings*, v. 97, Feb. 1958, p. 341-344.

Monkey kidney tissue cultures survive refrigeration at 4-6 C for periods up to 6 weeks. Cultures so treated can be returned to an incubator and maintained for 3-4 weeks at 34-35 C. Refrigerated cultures appear to retain full sensitivity to polioviruses.

7788* Effects of Reserpine and Chlorpromazine Upon Enterochromaffin Cell of the Rat. Bernard H. Marks, Robert W. Sorgen, and E. Russell Hayes. *Society for Experimental Biology and Medicine, Proceedings*, v. 97, Feb. 1958, p. 413-415.

Cytological evidence has been obtained, using a semiquantitative technic. Concomitant with release of serotonin, there is a loss of granulation in these cells.

7789* Proliferation of Human Amnion Cells (FL Strain) in Submerged Culture. Eldon V. Davis, Fletcher Glover, and William F. McLimans. *Society for Experimental Biology and Medicine, Proceedings*, v. 97, Feb. 1958, p. 454-456.

It is possible to maintain a stock culture which can supply cells for growth in roller tubes and Povitsky bottles without the necessity of a trypsinization procedure.

7790* Comparative Susceptibility of Cell Cultures to Vaccinia Virus: Application to the Standardization of Smallpox Vaccine. Ernest Cutchins and Joel Warren. *Society for Experimental Biology and Medicine, Proceedings*, v. 97, Feb. 1958, p. 456-462.

The infectivity of vaccinia virus in calf lymph for bovine, avian, and simian cell cultures has been measured in tissue culture, embryonated eggs, and rabbit epithelium. Monkey kidney roller tube or plaque titrations appear most sensitive to this virus.

7791* A New Group of Psychotomimetic Agents. L. G. Abood, A. M. Ostfeld, and John Biel. *Society for Experimental Biology and Medicine, Proceedings*, v. 97, Feb. 1958, p. 483-486.

A series of synthetic anticholinergic agents have been shown to possess potent psychotomimetic properties. Chemically, the agents are esters of piperidine and benzilic acid.

7792 The Total Synthesis of Reserpine. R. B. Woodward, F. E. Bader, H. Bickel, A. J. Frey, and R. W. Kierstead. *Tetrahedron*, v. 2, nos. 1-2, 1958, p. 1-7.

7793* Acute Radiation Syndrome in Man. Herbert B. Gerstner. *U. S. Armed Forces Medical Journal*, v. 9, Mar. 1958, p. 313-354.

7794* A Speculative Review of the Role of Endocrine Imbalances in the Genesis of Certain Cancers and Degenerative Diseases. George Crile, Jr. *U. S. National Cancer Institute, Journal*, v. 20, no. 2, Feb. 1958, p. 229-243.

7795* Comparative Chromosomal Studies on Mammalian Cells in Culture. I. The HeLa Strain and Its Mutant Clonal Derivatives. Ernest H. Y. Chu and Norman H. Giles. *U. S. National Cancer Institute, Journal*, v. 20, no. 2, Feb. 1958, p. 383-401.

Observations indicate that changed chromosomal constitutions, especially in chromosome number, must be considered in addition to gene mutation as mechanisms potentially responsible for the mutant phenotypes of these clones.

7796* Influence of Antigenic Factors in the Production of Antitumor Cytotoxic Sera. Richard A. Malmgren. *U. S. National Cancer Institute, Journal*, v. 20, no. 2, Feb. 1958, p. 417-429.

The degree of tumor inhibition, or cytotoxic potency, obtained with immune sera was evaluated in relation to the effectiveness of their preimmune counterparts and to the effectiveness of other antisera.

7797* Mutation of Polioviruses to Resistance to Neutralizing Substances in Normal Bovine Sera. N. Takemori, et al. *Virology*, v. 5, Feb. 1958, p. 30-55.

There is evidence that the inhibitor in sera from individual animals may differ both quantitatively and qualitatively. The results also strongly suggest that the NBS inhibitor is not antibody.

7798* Dynamics of Heterologous Interference Between Viable Viruses in Chick Embryo Fibroblast Monolayers. Seymour Levine. *Virology*, v. 5, Feb. 1958, p. 150-167.

Western equine encephalomyelitis virus (WEE) can suppress the production of Newcastle disease virus (NDV) in chick embryo fibroblast monolayers if added as late as 5 to 6 hrs. after the cells have been initially infected with NDV.

See also: **7887** (polarography of sulfa drugs); **7903** (boron in biological materials); **7968** (Si-containing amino acids); **7987** (carcinogenic nitrogen compounds); **7996** (lignin chemistry); **8062** (theoretical analysis of electrophoresis); **8067** (Mg stabilized ascorbic acid); **8310** (effect of γ-radiation on bacterial spores); **8771** (radioactive contamination by atomic-weapon tests); **8776** (analysis for radioactive fallout materials); **8830** (β and γ dose rates from terrestrially distributed sources); **8833** (effect of nuclear blast on mice in heavy concrete shelters).

CERAMICS AND CONCRETE

7799* (French.) Application of Statistics in the Determination of the Compressive Strength of Concrete. **Emploi de la statistique pour l'établissement de la résistance du beton à la compression.** Miloš Vorliček. *Acta Technica*, v. 3, no. 2, 1958, p. 121-155.

Theoretical study in order to find an analytic expression for the distribution of the above. Expression was derived from several formulas, which considered the compressive strength as a function of quality and proportion of the components, method of manufacture, conservation, and transport.

7800* (Russian.) The Thermal Stress State of Concrete Blocks Considering the Creep of Material. **Termonapriazhennoe sostoianie betonnykh blokov s uchetom polzuchesti materiala.** M. A. Zadoian. *Akademiia Nauk Armianskoi SSR, Izvestiia. Seriia Fiziko-Matematicheskikh Nauk*, v. 10, no. 5, 1957, p. 73-98.

Mathematical analysis.

7801 Subsieve Particle Size Measurements on Porcelain Materials. R. H. Lester. *American Ceramic Society Bulletin*, v. 37, Mar. 1958, p. 129-134.

Develops method for measurement of particle sizes of −325 m (44 μ) down to 0.1 μ utilizing the principle of gravitational and centrifugal sedimentation. The gravitational measurements involved hygrometer readings made in the usual manner. After a series of gravitational determinations, samples were centrifuged and additional hygrometer readings then made.

7802 Some Parameters Affecting Ceramic-to-Metal Seal Strength of a High-Alumina Body. Sandford S. Cole, Jr. and Frank J. Hynes, Jr. *American Ceramic Society Bulletin*, v. 37, Mar. 1958, p. 135-138.

Control of firing temperature and flux content can give stronger ceramic-to-metal seals and lower electrical losses. These desirable properties are gained at the expense of apparent porosity, apparent specific density, and modulus of rupture.

7803 Microstructure of Ceramics for Communication Equipment. W. F. Janssen and M. D. Rigterink. American *Ceramic Society Bulletin*, v. 37, Mar. 1958, p. 152-156.

Methods used to determine the microstructure of ceramics, and the relative merits of these methods in evaluating the suitability of various materials for use in communication equipment. Correlation of microstructure with dielectric properties, ability to produce parts with very fine detail, and adherence of carbon and metal layers.

7804 Determination of Residual Stresses in Titanium Carbide-Base Cermets by High-Temperature X-Ray Diffraction. Herbert W. Newkirk, Jr. and Harry H. Sisler. *American Ceramic Society, Journal*, v. 41, Mar. 1, 1958, p. 93-103.

The crystal structure and thermal expansion of TiC, Ni, and two TiC-base cermets were determined between room temperature and 1100 C (2012 F). No structural changes were observed. An abnormal rate of expansion was observed for pure Ni near the Curie temperature 353 C (665 F), and for the Ni and carbide phases in the cermets at about 816 C. (1500 F). The expansion coefficient of pure Ni and the Ni phase in the cermets was found to be approximately twice that of pure TiC and the carbide phase in the cermets. The brittleness and poor impact strength of the cermets was attributed to the large residual stresses present in these materials as a result of this difference in thermal expansion.

7805* (Russian.) Testing Cermets. **Ispytaniia metallokeramiki.** G. M. Lavrukhin and K. M. Nardov. *Avtomobil'naia Promyshlennost'*, 1958, no. 1, Jan., p. 14-16.

Applications in the automobile industry; survey of frictional properties.

7806* (Russian.) Fire-Resistance of the Bent Elements Made From Ordinary, and Prestressed Reinforced Concrete. **Ognestoikost' izgibaemykh elementov iz obychnogo i predvaritel'no napriazhennogo zhelezobetona.** V. I. Murashev and A. I. Iakovlev. *Beton i Zhelezobeton*, 1957, no. 12, Dec., p. 467-472.

Three factors characterized the limit of fire-resistance: occurrence of irreversible deformation, loss of strength, and the irreversible loss of rigidity.

7807* (Russian.) Treating Concrete With Pure Saturated Steam. **Teplovaia obrabotka betona v srede chistogo nasyshchennogo para.** L. A. Semenov and N. I. Podurovskii. *Beton i Zhelezobeton*, 1957, no. 12, Dec., p. 480-486.

Two to three hours of isothermic treatment with steam produced materials that possess the required strength. The best temperature suggested is 80 C.

7808 Phase Equilibria in the System ZnO-P_2O_5. Fred L. Katnack and F. A. Hummel. *Electrochemical Society, Journal*, v. 105, Mar. 1958, p. 125-133.

7809 Cracking in Powder Compacts. W. M. Long. *Engineering*, v. 185, Feb. 21, 1958, p. 254-255.

Makes a step-by-step analysis of processes taking place in the compact during pressing. The powder in the die has some of the characteristics of a solid, but also can flow somewhat like a liquid. During pressing, the pressure of the powder on the walls of the die may be regarded as the sum of two components, one being an "elastic" component deriving from the elastic properties of the solid material and the other a "plastic" component deriving from the flow properties of the powder. After the ram pressure has reached its maximum and been released, the elastic component of the wall pressure disappears, but the plastic component does not, for the powder has become a compact, and the particles tend to retain the configuration reached at the point of maximum pressure.

7810 Use of Castable Ceramics for High Temperature Fixtures. Herbert Schwartz. *Industrial Heating*, v. 25, Feb. 1958, p. 362 + 4 pages.

A wide range of high-temperature tooling problems now can be economically solved by the application of Sur Braze S-2. The material can be accurately cast to the desired fixture shape suitable for the particular heating application.

7811* (French.) Theoretical and Practical Information Concerning the Thermal Shock Resistance of Vitrified Products. **Renseignements théoriques et pratiques concernant la résistance au choc thermique des produits vitrifiés.** *Industrie Céramique*, 1958, no. 493, Jan., p. 11-15.

Index of thermal shock resistance. Relationships between crystalline and vitreous phases. Effects of composition of glazes. Applications.

7812* (German.) Effect of a Mechanical Treatment on the Capacity for Reaction of Solid Substances. **Der Einfluss einer mechanischen Bearbeitung auf das Reaktionsvermögen von festen Stoffen.** Gerhard Naeser and Werner Scholz. *Kolloid Zeitschrift*, v. 156, no. 1, Jan. 1958, p. 1-8.

"Mechanical activation", that is the increase of the reactivity of solid substances by mechanical treatment at room temperature, was applied to ceramic materials, like burnt dolomite and powdered quartz and also to iron oxides, fluorite, and calcite.

7813 Ceramic Dielectries With Higher Stability for Capacitors. O. Drexler. *Matronics,* no. 13, Dec. 1957, p. 235-238. (TK453 M42 Contin.)

Development trends. Survey of materials now available.

7814* Preparing Limestone for Cement Manufacture. *Mine & Quarry Engineering,* v. 24, Mar. 1958, p. 90-99.

Production and crushing of limestone and shale.

7815* (Russian.) The Preparation, Properties and Technical Application of Molybdenum Disilicide. **Poluchenie, svoistva i tekhnicheskoe primenenie disilitsida molibdena.** G. V. Samsonov and V. S. Neshpor. *Ogneupory,* v. 23, no. 1, 1958, p. 28-35.

Preparation of $MoSi_2$ powder by heating mixture of Mo and Si in the form of briquets at 1000 C for 1 hr. Hot pressing at 1900 C is the most suitable method of production of articles. $MoSi_2$ is scale-resistant and chemically stable, has high heat conductivity and hardness.

7816* (German.) The Determination of the Reactive MgO in Calcined Magnesite. **Die Bestimmung von reaktionsfähigem Magnesiumoxyd in kaustisch gebranntem Magnesit.** H. Haas, F. Kahler, and K. Reischl. *Radex Rundschau,* 1958, no. 1, Jan., p. 47-59.

Definition of "active" and "reactive" MgO; origin; description of the basic idea of a quantitative determination and the necessary apparatus; reactions of accompanying substances.

7817* (French.) Structure of Aqueous Suspensions of Pure and Mixed Cements and Technical Properties of These Suspensions in the Hardened State. **Sur la structure des suspensions aqueuses des ciments purs ou mélangés et sur les propriétés techniques de ces suspensions durcies.** A. Steopoe. *Revue des Matériaux de Construction (Edition C),* 1958, no. 508, Jan., p. 1-9.

Cellular structure of pure cement. Hair-crack solid state after hardening. Effects of mineral admixtures rich in silica or lime.

7818* (French.) Effect of Low Temperatures on the Hardening of Cements, Especially on Slag-Based Cements. **Influence de l'abaissement de la température sur le durcissement des ciments, tout specialement des ciments à bas de laitiers.** Léon Blondiau. *Revue des Matériaux de Construction (Edition C),* 1958, no. 508, Jan., p. 15-32.

Effects of near freezing temperatures on the hardening of portland, blast-furnace, and super-sulfate cements. All behave similarly to −3 C. Troubles with any cement at low temperature are due to excess water.

7819* (French.) Some Physico-Chemical Aspects of the Corrosion of Refractories. **Quelques aspects physico-chimiques de la corrosion des produits réfractaires. I.** G. van Gijn. *Silicates Industriels,* v. 23, no. 2, Feb. 1958, p. 63-66.

Corrosion delay caused by the high viscosity of the reaction layer formed on brick. Penetration of ions from the slag into the binder phase of the refractory.

7820* (French.) Stabilization of Cubic Zirconia. **Sur la stabilisation de la zircone cubique.** Jochen Stocker, Robert Collongues, and Monique Moser. *Silicates Industriels,* v. 23, no. 2, Feb. 1958, p. 67-71.

Allotropic varieties of ZrO_2. The coprecipitation method and its advantages. Solid cubic solutions. Mechanism of stabilization with various oxides. ZrO_2-MO or ZrO_2-M_2O combinations are metastable at low temperatures.

7821* (German.) Pozzolana Mortars and Their Hardening. **Ueber Puzzuolanmörtel und deren Erhärtung.** H. Hart. *Silicates Industriels,* v. 23, no. 2, Feb. 1958, p. 72-74.

Hardening mechanism of mortars prepared with volcanic rock or ash. Hardening of pozzolana-lime mixtures under various conditions.

7822* (German.) Vitrified Bodies of Indian Talc With Low Thermal Expansion. **Dichtgebrannte Massen aus indischem Talk mit niedriger Wärmeausdehnung.** Bahn Bushan and H. N. Roy. *Sprechsaal,* v. 91, no. 4, Feb. 20, 1958, p. 67-70.

The influence of Li_2CO_3 additions on cordierite bodies. A mean coefficient of expansion of 20.0 x 10^{-7} between 20 and 1000 C was obtained.

7823* (Russian.) New Fine-Grained Graphite-Carbon Materials. **Novye uglegrafitovye materialy s melkozernistoi strukturoi.** A. M. Sigarev. *Tsvetnye Metally,* v. 31, no. 2, Feb. 1958, p. 52-59.

Analysis of methods of pressing anodes for Hg arc rectifiers, antifrictional material, molds for alloy casting, and other articles. Suggested pressure is 600 kg/cm².

7824 Attenuation Properties of High Density Portland Cement Concretes as a Function of Temperature. W. L. Bunch. *U. S. Atomic Energy Commission,* HW-54656, Jan. 22, 1958, 55 pp. (UF767 Un3.1hw Contin.)

Neutron and γ attenuation of two high-iron-content concretes were determined up to 320 C. The measured changes in density and attenuation properties are analyzed relative to water loss.

7825* (French.) Some Aspects of Thermal Development and Stabilization of the Properties of Glass. **Certains aspects de l'évolution thermique et de la stabilisation des propriétés du verre.** L. Prod'homme. *Verres et Réfractaires,* v. 11, no. 6, Nov.-Dec. 1957, p. 351-369.

General influence of temperature on the physical properties of several glasses of different compositions, including some binary glasses. Thermal changes in index of refraction, density, specific refractivity, and viscosity.

7826* (Russian.) On the Hardening of Magnesium Chloride Cements. **K voprosu o tverdenii khlormagnezial'nykh tsementov.** A. G. Bergman and I. P. Vyrodov. *Zhurnal Prikladnoi Khimii,* v. 31, no. 1, Jan. 1958, p. 19-25.

Hydrated MgO admixed with a 35% solution of $MgCl_2$, hardens in 5 to 7 hrs. The 28-day cured stone-like mass contains no hydrated MgO. X-ray analysis of MgO, hydrated MgO, oxychloride, and several Mg cements.

See also: **8031** (graphitization of carbon); **8410** (reinforced concrete structures); **8556** (rammed cupola lining); **8663** (cutting with ceramic tools); **8665** (glass metalworking lubricants); **8672** (cutting properties of ceramic tools); **8673** (comparison of ceramic cutting tools); **8740** (electropolishing and electroetching cermets); **8775** (production and application of reactor graphite); **8909** (thermal effect on titanates).

CHEMICAL ENGINEERING

7827* (Russian.) The Theory of Motion of Small Aerosol Particles in the Diffusion Field. **Teoriia dvizheniia malykh aerozol'nykh chastits v pole diffuzii.** B. V. Deriagin and S. P. Bakanov. *Akademiia Nauk SSSR, Doklady,* v. 117, no. 6, Dec. 21, 1957, p. 959-962.

Mathematical calculation for the mixture of gases with the mass of molecules M_1 and $M_2 > M_1$ in the presence of small gradients of the partial concentrations N_1 and N_2 that satisfy condition: grad (n_1+n_2)=grad p/kT=O (p=full pressure).

7828* Some Aspects of Particle Size in Aerosol Studies. Charles L. Punte. *Armed Forces Chemical Journal,* v. 12, no. 2, Mar.-Apr. 1958, p. 28-32.

Data on rate of fall of particles in air, factors influencing aerosol stability, efficiency of collection of particles on a surface in an aerosol stream, and deposition of aerosols. Importance of particle size in air pollution and industrial toxicity studies.

7829* (German.) A Contribution to the Bitumen Emulsion Technique. **Beitrag zur Technik von Bitumenemulsionen.** Hans Nüssel and Albert Buhs. *Bitumen, Teere, Asphalte, Peche,* v. 9, no. 2, Feb. 1958, p. 33-38.

Different methods used to decrease bitumen viscosity.

7830* The Separation of Uranium and Plutonium From Fission Products by Tributyl Phosphate. J. T. Wood and J. A. Williams. *British Chemical Engineering,* v. 3, Mar. 1958, p. 147-150.

7831 Supported Oxide Catalysts in the Production of Polythene. E. G. Curphey. *British Plastics*, v. 31, Feb. 1958, p. 63-65.

Characteristics and polymerization mechanisms of supported oxide catalysts; polymerization techniques; role of solvents; modifications in catalyst structure.

7832 Let Computers Pick Your Exchangers. R. E. Githens, Jr. *Chemical Engineering*, v. 65, Mar. 10, 1958, p. 143-146.

Automatic computers relieve engineers of tedious calculations, give optimum designs of heat exchangers quickly, and save money.

7833 Make a Nomograph to Find Condensate Film Temperature. F. Rodriguez and J. C. Smith. *Chemical Engineering*, v. 65, Mar. 10, 1958, p. 150-151.

Nomograph gives film temperatures of condensers handling noncondensables.

7834 Heat Capacity Ratios—5 Hydrocarbons. Joseph Joffe and E. G. Delaney. *Chemical Engineering*, v. 65, Mar. 24, 1958, p. 138-141.

Graphs of heat capacity ratios for ethane, ethylene, n-butane, methane, and propane.

7835 Where We Stand in Radiation Processing. Joseph J. Martin. *Chemical Engineering Progress*, v. 54, Feb. 1958, p. 66-71.

Review evaluates most recent work in the field of radiation chemical processing.

7836 High Radiation Level Hydroclone Centrifuging Removes Homogeneous Reactor Fission Products. W. D. Burch. *Chemical Engineering Progress*, v. 54, Feb. 1958, p. 79-82.

Insoluble corrosion and fission products are removed in a hydraulic cyclone operated at reactor temperature and pressure.

7837* An Analysis of Chemical Reactor Stability and Control. I. The Possibility of Local Control, With Perfect or Imperfect Control Mechanisms. II. The Evolution of Proportional Control. III. The Principles of Programming Reactor Calculations. Some Extensions. Rutherford Aris and Neal R. Amundson. *Chemical Engineering Science*, v. 7, no. 3, 1958, p. 121-155.

7838* The Flow-Structure in Packed Beds. A Theoretical Investigation Utilizing Frequency Response. G. A. Turner. *Chemical Engineering Science*, v. 7, no. 3, 1958, p. 156-165.

A method is proposed whereby the flow structure of a system, or the physical structure of a packed bed or porous solid, may be analyzed in terms of a model chosen to approximate hydrodynamically the system under investigation and so that its effect on a flow of fluid containing a sinusoidally varying concentration of solute can be mathematically analyzed.

7839* (Spanish.) Gases From Cracking. Production and Composition. **Gases de craquing. Producción y composición.** Jose Novella Moreno. *Combustibles*, v. 17, no. 93, Sept.-Oct. 1957, p. 309-321.

Relationship of gas and gasoline yields obtained by cracking. Description of thermal reforming; high temperature processes; catalytic method.

7840 Nitrogen Aerosols. Francis A. Mina. *Drug and Cosmetic Industry*, v. 82, no. 3, Mar. 1958, p. 321 + 2 pages.

Advantages of N for dispensing pressurized products include low cost, inertness, insolubility, and pressure-temperature relationship.

7841 Electrostatics in the Petroleum Industry. The Prevention of Explosion Hazards. A Royal Dutch/Shell Research and Development Report. A. Klinkenberg and J. L. van der Minne, editors. 191 pp. 1958. Elsevier Publishing Co., New York. (TP690.6 K83e Over.)

Theoretical, laboratory, and plant-scale studies were made to determine the relation between static electricity and explosions and to find methods of preventing such explosions.

7842 The Packing and Flow of Spheres. W. H. Denton. *Great Britain, Atomic Energy Research Establishment, A.E.R.E. E/R* 1095, 1957, 19 p. (UF767 G79.1a Contin.)

A study of the consistency of the voidage (or density of packing) in beds of spheres packed at random, the extent of the changes in voidage due to all the factors likely to affect it, and the motion of individual spheres while the beds is discharging under gravity through an orifice at the base of the container and being recharged on to the top surface.

7843* Industrial Chemicals. W. L. Faith, Donald B. Keyes, and Ronald L. Clark. 2nd Ed. 844 pp. 1957. John Wiley & Sons, New York. (TP200 F17i2 Ref.)

A survey of 140 chemicals, covering production, uses, prices, properties, grades, packaging, shipping, manufacture, and economic trends.

7844 Design and Operation of Continuous Thickeners. N. J. Hassett. *Industrial Chemist*, v. 34, Mar. 1958, p. 116-120.

A simple graphical representation of thickener performance and operation was developed which enables thickener performance to be predicted quantitatively, correlating total solids input, feed concentration, discharge rate, and discharge concentration. (To be continued.)

7845 The Formulation and Solution of Equations Describing Non-Steady Processes. W. Smith. *Industrial Chemist*, v. 34, Mar. 1958, p. 121-125.

Solution of the problem of non-steady heat transfer between a pipe having a high heat capacity and a fluid passing through the pipe at a steady rate.

7846 The Drying of Gases With Activated Alumina. A. W. Miller and C. W. Roberts. *Industrial Chemist*, v. 34, Mar. 1958, p. 141-145.

Behavior of alumina in drying units including pressure drop through beds of three sizes of tablets, dynamic adsorptive capacity, and the heat of adsorption of water vapor.

7847 The Excer Process. Preparing Uranium Tetrafluoride by Ion Exchange and Electrolysis. I. R. Higgins, J. T. Roberts, C. W. Hancher, and J. A. Marinsky. *Industrial and Engineering Chemistry*, v. 50, Mar. 1958, p. 285-292.

Basic steps are ion exchange purification and concentration; precipitation, by aqueous electrolytic reduction of the three-quarter hydrate of uranium tetrafluoride; and dehydration of the salt.

7848 Reforming Studies With Molybdena-Alumina Catalyst. J. L. Wilson and M. J. Den Herder. *Industrial and Engineering Chemistry*, v. 50, Mar. 1958, p. 305-308.

Data were obtained with a reference catalyst and reference naphtha in a bench-scale fixed-bed unit. The effects of temperature, space velocity, and H-addition rate on octane number and coke formation were studied.

7849 Oxonation of Rosin. D. R. Levering and A. L. Glasebrook. *Industrial and Engineering Chemistry*, v. 50, Mar. 1958, p. 317-320.

Rosin reacts with CO and H to add a methylol group to the unsaturated components. A solvent and preformed cobalt carbonyl are needed for high yields.

7850 Maleic Modification of Acid-Refined Tall Oil Varnishes. E. E. McSweeney, R. K. Brandt, and E. R. Mueller. *Industrial and Engineering Chemistry*, v. 50, Mar. 1958, p. 327-328.

Formation of minor amounts of insoluble material during cooking of maleic-modified tall oil esters can be prevented by preesterification of tall oil with polyol before maleic addition, or reaction of maleic and tall oil at 450 F. The latter method is preferred because it is somewhat faster. Formation of insolubles is not directly related to tall oil abietic acid content.

7851 Liquid Phase Mass Transfer Rates and Effective Interfacial Area in Packed Absorption Columns. Fumitake Yoshida and Tetsushi Koyanagi. *Industrial and Engineering Chemistry*, v. 50, Mar. 1958, p. 365-374.

7852 Thirteenth Annual Review of Unit Operations in Chemical Engineering. *Industrial and Engineering Chemistry*, v. 50, Mar. 1958, p. 420-484.

Reviews work in absorption, humidification, adsorption, centrifugation, crystallization, drying, evaporation, flotation, flow of fluids, high temperature distillation, ion exchange, liquid extraction, materials handling, mixing, and size reduction.

7853 Sixth Annual Review of Fundamentals of Chemical Engineering. *Industrial and Engineering Chemistry*, v. 50, Mar. 1958, p. 485-568.

Review of 1957 developments in heterogeneous catalysis, molecular transport properties of fluids, diffusion in metals, oxidation of metals, colloids and surface behavior, computers, mathematics and statistics, process control and automation, heat and mass transfer, fluid dynamics, and thermodynamics.

7854* (Russian.) Compressed Hydrocarbon Gases as Solvents of Petroleum and Petroleum By-Products. **Szhatye uglevodorodnye gazy kak rastvoriteli nefti i neftianykh ostatkov. II.** T. P. Zhuze and G. N. Iushkevich. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, 1957, no. 12, Dec., p. 83-86.

Solvent capacity of ethylene, propane, propylene, and a mixture of propane and propylene.

7855* (Russian.) Polymerization of Amylenes With Phosphoric Acid Catalyst. **Polimerizatsiia amilenov na fosfornokislotnom katalizatore.** E. G. Vol'pova. *Khimiia i Tekhnologiia Topliv i Masel*, 1958, no. 2, Feb., p. 54-57.

The pentane-amylene fraction from thermal cracking was studied. Properties and use of kieselguhr, coated with phosphoric acid as a catalyst were investigated.

7856* (Hungarian.) Calculation of Distillation Columns With Multiple Input and Output. **Több helyen táplált és megesapolt lepárló oszlopok számítása.** György Csapó. *Magyar Kémikusok Lapja*, v. 12, no. 2, Feb. 1957, p. 61-63.

Calculation of the theoretical number of plates and of the working line necessary for determination of the unit number of transfer.

7857* (Hungarian.) Extraction of Paraffin From Crude-Oil Products by Means of Extractive Crystallization. **Kőolajtermékek paraffinmentesítése extraktív kristályosítással.** Mihály Freund, József Báthory, and Miklós Érdi. *Magyar Kémikusok Lapja*, v. 12, no. 2, Feb. 1957, p. 64-71.

Review of the literature.

7858 (German.) Measurement and Control in Chemical Engineering. **Messen und Regeln in der Chemischen Technik.** J. Hengstenberg, B. Sturm, and O. Winkler, editors. 1261 pp. 1957. Springer-Verlag, Berlin. (TP157 H38m)

Covers temperature measurements, volume and flow meters, pressure and pressure difference measurement, physical methods of analysis, electrochemical measurements, special processing methods, control techniques, design and operation of measurement and control instruments, and organization of industrial control.

7859 Tips for High-Pressure Piping. E. E. Ludwig. *Petroleum Refiner*, v. 37, Mar. 1958, p. 155-161.

General plant layout; influence of high pressures on piping; metal thickness for internal pressure assembly, and erection of high-pressure plants.

7860 Newest Acetylene Process From Japan. Shigeru Tsutsumi. *Petroleum Refiner*, v. 37, Mar. 1958, p. 169-171.

Operating at 1200-1250 C at reduced pressures this process gives good yields of C_2H_2 from C_3 to C_4 hydrocarbons.

7861 Predicting Convergence Pressure. J. M. Lenoir and G. A. White. *Petroleum Refiner*, v. 37, Mar. 1958, p. 173-181.

This method of predicting equilibrium constants for multicomponent mixtures over a wide range of temperature and pressure is applied to mixtures of paraffins, olefins, napthenes, aromatics, and non-hydrocarbons which normally occur in such mixtures.

7862 Measure Vapor Losses With Radioisotopes. A. J. Brandel and D. E. Hull. *Petroleum Refiner*, v. 37, Mar. 1958, p. 195-196.

Krypton-85 is used to measure rates of gas losses from confined spaces.

7863* (German.) Automatic Controls for Batch Processing in the Chemical Industry. **Regelung in Chargenbetrieben der chemischen Industrie.** K. Hengst. *Regelungstechnik*, v. 6, no. 2, 1958, p. 42-47.

Some problems are discussed in detail.

7864 (Italian.) Practical Problems of the Purification of Gas With Ethanolamine. **Alcuni problemi di esercizio nella depurazione del gas con etanolammina.** P. W. Sherwood. *Rivista dei Combustibili*, v. 12, no. 1, Jan. 1958, p. 44-52.

Difficulties in treating gas on an industrial scale with different amines: mechanical or chemical loss of the solution; corrosion of the apparatus and preventive measures.

7865 Thermodynamics for Chemical Engineers. Harold C. Weber and Herman P. Meissner. 2nd Ed. 507 pp. 1957. John Wiley & Sons, New York. (TJ265 W38t2)

Includes data on elementary fluid flow, power cycles, engines, refrigeration, solutions, heat capacities, chemical equilibria, and electrochemical effects.

7866 Equipment for Nuclear Fuel Reprocessing. Thomas J. Colven, Jr. *U. S. Atomic Energy Commission, DP*-239, Oct. 1957, 20 pp. (UF767 Un3.1dp Contin.)

Design information and preliminary operating characteristics for a critically safe mixer-settler, two continuous solvent washing units, and a number of stream jet syphons that have been tested on nitric acid-tributyl phosphate systems.

7867 Mixing Efficiency in Mixer-Settlers. The Effect of Flow and Paddle Variables. William J. Mottel and Thomas J. Colven, Jr. *U. S. Atomic Energy Commission, DP*-254, Dec. 1957, 18 pp. (UF767 Un3.1dp Contin.)

Transfer of heat was used as a measure of the mixing efficiency of a 1-in. shrouded paddle in a mixer-settler. Effect of paddle speed, total flow, flow ratio, and mixer configuration was determined.

7868 The Polymerization and Precipitation of Plutonium (IV) in Nitric Acid. A. Brunstad. *U. S. Atomic Energy Commission, HW*-54203, Dec. 17, 1957, 20 pp. (UF767 Un3.1hw Contin.)

A study of conditions resulting in polymer formation.

7869 Separations Chemistry Quarterly Progress Report, April-June 1957. G. E. Brand, et al. *U. S. Atomic Energy Commission*, NAA-SR-2168, Mar. 1, 1958, 37 pp. (UF767 Un3.1na Contin.)

Reports work on pyroprocessing methods for U fuels, mechanism of fission product extraction-oxide drossing, and high temperature separations chemistry of Th fuels.

See also: **8332** (instrumentation for the mineral industries); **8854** (flotation with pyridine bases).

CHEMISTRY—ANALYTICAL

7870* (Romanian.) A New Gravimetric Method for the Fast Determination of Cadmium. **O noua metoda gravimetrica pentru dozarea expeditiva a cadmiului.** J. Dick and J. Ristici. *Academia Republicii Populare Romine. Baza de Cercetări Ştiinţifice Timişoara. Studii şi Cercetări Ştiinţifice. Seria Ştiinţe Chimice*, v. 4, nos. 1-2, Jan.-June 1957, p. 55-59.

The precipitation of Cd with dimethylamino-phenyl-dimethyl pyrazolone (Pyramidon) in the presence of SCN- is very fast, and the stability of the precipitate, $[CdPyr_2](SCN)_2$, obtained at 110 C makes direct weighing possible.

7871* (Romanian.) A New Method for Determining Chromium Anion. **O noua metoda de dozare a anionului cromic.** M. Mitranescu. *Academia Republicii Populare Romine. Baza de Cercetări Ştiinţifice Timişoara. Studii şi Cercetări Ştiinţifice. Seria Ştiinţe Chimice*, v. 4, nos. 1-2, Jan.-June 1957, p. 79-83.

Consists of a thermal reduction of $HCrO_4^-$ in acid medium with a certain excess of the titrated solution of $H_2SO_4 \cdot N_2H_4$, and of the subsequent iodometric titration of the excess of the reducing agent in the presence of Rochelle salt.

7872* (Romanian.) A New Rapid Technical Method for Determining Silicon in Slag. **O metoda tehnica rapida pentru dozarea siliciului din zgura.** A. Dewald and R. Pomoje. *Academia Republicii Populare Romine. Baza de Cercetări Ştiinţifice Timişoara. Studii şi Cercetări Ştiinţifice. Seria Ştiinţe Chimice*, v. 4, nos. 1-2, Jan.-June 1957, p. 105-110.

Silicon dioxide is changed to $K_2[SiF_6]$ by adding KCl and HF. The precipitate is filtered, washed with saturated KCl solution, dissolved in hot water, and titrated with 0.1 *N* NaOH.

7873 The Determination of Poly(Ethyl Esters) in Methyl Methacrylate Copolymers. J. Haslam, J. B. Hamilton, and A. R. Jeffs. *Analyst*, v. 83, Feb. 1958, p. 66-71.

The alkoxyl groups are converted to the corresponding iodides, which are then determined by gas-liquid chromatography.

7874 Precise Determination of Plutonium by Differential Spectrophotometry. G. Phillips. *Analyst*, v. 83, Feb. 1958, p. 75-79.

7875 The Determination of Trace Amounts of Lead and Bismuth in Cast Iron. R. C. Rooney. *Analyst*, v. 83, Feb. 1958, p. 83-88.

Method involves extraction of the iron with isobutyl acetate from HCl solution and extraction of Pb and Bi as their diethyldithiocarbamate complexes with chloroform from ammoniacal tartrate-cyanide solution. An acidified tartrate base electrolyte is used for simultaneous determinations with a cathode-ray polarograph.

7876 A Micro Procedure for the Electrolytic Determination of Lead in Copper-Base Alloys. H. C. J. Saint. *Analyst*, v. 83, Feb. 1958, p. 88-92.

7877 *o*-Dithiols in Analysis. VI. Diacetyltoluene-3:4-dithiol as a Coagulant, Catalyst and Precipitant for Sulphur and Metallic Sulphides. Robert E. D. Clark. *Analyst*, v. 83, Feb. 1958, p. 103-106.

7878* (English.) **Coulometric Determinations.** F. Čůta. *Analytica Chimica Acta*, v. 18, nos. 1-2, Jan.-Feb. 1958, p. 45-50.

Two methods were developed. Determinations are based on reactions of the substances to be determined with halogens, using different oxidizing or reducing agents, and with acids or bases.

7879* (English.) **New Techniques in Radiochemical Determinations Using Polarographic Methods.** Daniel L. Love. *Analytica Chimica Acta*, v. 18, nos. 1-2, Jan.-Feb. 1958, p. 72-80.

Radioisotopes that can be polarographically reduced to the zero oxidation state amalgamate with Hg, are removed from the solution, and the radioactivity determined.

7880* (English.) **Circular-Paper Chromatography in the Separation of Ions. Separation of Precious Metals.** A. K. Majumdar and M. M. Chakrabartty. *Analytica Chimica Acta*, v. 18, no. 3, Mar. 1958, p. 193-196.

A circular-paper chromatographic method for separating the precious metals Pd^{+2}, Pt^{+4}, Ir^{+4}, Rh^{+3}, Ru^{+3}, Os^{+4}, and Au^{+3} using several solvent mixtures with or without complexing agents. Mixtures of microamounts of three or four of these metals can be effectively separated into distinct circular zones within one or two hours.

7881* (English.) **Salting-Out Chromatography. III. Aliphatic and Polyglycol Ethers, Carboxylic Acids.** Roger Sargent and Wm. Rieman, III. **IV. Aldehydes and Ketones.** Arthur Breyer and Wm. Rieman, III. *Analytica Chimica Acta*, v. 18, no. 3, Mar. 1958, p. 204-213.

7882* (English.) **Coulometric Titration of Uranium and Uranium-Vanadium Mixtures With +3 Titanium.** John H. Kennedy and James J. Lingane. *Analytical Chimica Acta*, v. 18, no. 3, Mar. 1958, p. 240-244.

7883 Direct Determination of Isoparaffins and *n*-Paraffins in Olefin-Free Gasoline by Mass Spectrometer. W. C. Ferguson and H. E. Howard. *Analytical Chemistry*, v. 30, Mar. 1958, p. 314-317.

The resolution of normal and isoparaffins in any 100 to 400 F hydrocarbon mixture containing less than 3.0% olefin, using data from a single mass spectrometer run, is described.

7884 Mass Spectrometer-Type Analysis for Olefins in Gasoline. Louis Mikkelsen, R. L. Hopkins, and D. Y. Yee. *Analytical Chemistry*, v. 30, Mar. 1958, p. 317-321.

7885 Some Factors Influencing the Efficiency of Gas-Liquid Partition Chromatography Columns. W. J. de Wet and Victor Pretorius. *Analytical Chemistry*, v. 30, Mar. 1958, p. 325-329.

Effects of nature and linear velocity of the carrier gas, column temperature, particle size of the solid support, density of the column packing, and amount of liquid phase used were studied.

7886 Alternating Current Polarography. Improved Experimental Arrangement, Examination of Theory, and Study of Cadmium(II) Reduction. Henry H. Bauer and Philip J. Elving. *Analytical Chemistry*, v. 30, Mar. 1958, p. 334-341.

7887 Voltammetry at Solid Electrodes. Anodic Polarography of Sulfa Drugs. John D. Voorhies and Ralph N. Adams. *Analytical Chemistry*, v. 30, Mar. 1958, p. 346-350.

Anodic oxidation of sulfa drugs was investigated at a rotating Pt electrode by a current-scanning technique.

7888 Automatic Determination of Uranium in Process Streams. H. W. Bertram, et al. *Analytical Chemistry*, v. 30, Mar. 1958, p. 354-359.

An automatic instrument based on a derivative polarograph was developed to analyze concentrations of 100 to 200 grams per liter of U.

7889 Volumetric Determination of Magnesium in Titanium. M. J. Miles, W. J. Mesimer, and Mae Atkin. *Analytical Chemistry*, v. 30, Mar. 1958, p. 361-363.

The Mg is titrated with a standard solution of disodium EDTA using Eriochrome Black T mixed with methyl red as the indicator. Titanium and elements that interfere with the EDTA titration are eliminated by an ammonium acetate separation.

7890 Determination of Oxygen in Titanium. Modified Vacuum Fusion Apparatus and Platinum Bath Technique. S. J. Bennett and L. C. Covington. *Analytical Chemistry*, v. 30, Mar. 1958, p. 363-365.

7891 Wet Ash Spectrochemical Method for Determination of Trace Metals in Petroleum Fractions. John Hansen and C. R. Hodgkins. *Analytical Chemistry*, v. 30, Mar. 1958, p. 368-372.

Method employs Cu metal powder as a carrier on which the trace metal contaminants of petroleum fractions are deposited when the sample is decomposed by a H_2SO_4-wet ash method.

7892 Determination of Alpha-Glycol Content of Epoxy Resins. George A. Stenmark. *Analytical Chemistry*, v. 30, Mar. 1958, p 381-383.

Method involves $CHCl_3$ as the solvent and an alcoholic solution of a quaternary ammonium periodate as the reagent.

7893 Nature of Bindschedler's Green. Preparation for Analysis of Hydrazo Compounds. H. J. Shine, Robert L. Snell, and Johnnie C. Trisler. *Analytical Chemistry*, v. 30, Mar. 1958, p. 383-384.

7894 Separation of 132° to 138°C. Fraction of Petroleum. Bicycloparaffins in Gasoline Fraction of Petroleum. Beveridge J. Mair, Paul E. Eberly, Jr., Ned C. Krouskop, and Frederick D. Rossini. *Analytical Chemistry*, v. 30, Mar. 1958, p. 393-400.

7895 Automatic Unit for Determination of Volatile Matter in Coal, Coke, and Char. R. P. Hensel and S. A. Jones. *Analytical Chemistry*, v. 30, Mar. 1958, p. 402-404.

Apparatus permits close control of the heating, is sufficiently flexible to be adaptable to many materials, and automatically controls the entire operation.

7896 Rapid and Precise Carbon-Hydrogen Determination. Automatic Macrocombustion Apparatus. T. T. White, et al. *Analytical Chemistry*, v. 30, Mar. 1958, p. 409-414.

7897 Certain Rare Earths in Purified Thorium and Uranium Preparations. Chemical Isolation and Spectrographic Determination. Cyrus Feldman and Janus Y. Ellenburg. *Analytical Chemistry*, v. 30, Mar. 1958, p. 418-422.

7898 Continuous Sampling and Ultramicrodetermination of Nitrogen Dioxide in Air. Morris B. Jacobs and Seymour Hochheiser. *Analytical Chemistry*, v. 30, Mar. 1958, p. 426-428.

Air is aspirated through a fritted-glass bubbler containing 0.1*N* alkali solution. The absorbed NO_2 is determined colorimetrically

as the azo dye by using it to diazotize sulfanilamide in phosphoric acid and then coupling it with *N*-(1-naphthyl)-ethylenediamine dihydrochloride.

7899 Photometric Determination of Zinc Oxide in Rubber Products. Absorptiometric and Turbidimetric Methods Using Sodium Diethyl Dithiocarbamate. K. E. Kress. *Analytical Chemistry*, v. 30, Mar. 1958, p. 432-440.

7900 Infrared Identification of Some Sulfur Derivatives of Long-Chain Fatty Acids. Heino Susi, N. H. Koenig, W. E. Parker, and Daniel Swern. *Analytical Chemistry*, v. 30, Mar. 1958, p. 443-446.

Derivatives containing sulfide, sulfoxide, and sulfone groups were studied.

7901 Microdetermination of Chromium With 1,5-Diphenylcarbohydrazide. Thomas L. Allen. *Analytical Chemistry*, v. 30, Mar. 1958, p. 447-450.

Most important variables are quality of the 1,5-diphenylcarbohydrazide and quality of stock solutions of this reagent. Melting point is a convenient criterion for purity of crystalline reagent, as is color for quality of its stock solutions.

7902* (German.) Polarography in Non-Aqueous Solutions. **Die Polarographie in nichtwässrigen Lösungen.** V. Gutmann and G. Schöber. *Angewandte Chemie*, v. 70, no. 4, Feb. 21, 1958, p. 98-104.

7903* Analysis of Biological Materials for Boron. W. H. Hill, et al. *Archives of Industrial Health*, v. 17, no. 3, Mar. 1958, p. 210-217.

7904 Application of Ion-Exchange Chromatography to the Analysis of Commercial Triphosphate. W. G. Spangler, D. E. Howes, Jr., and J. A. Kish. *ASTM Bulletin*, 1958, no. 228, Feb., p. 61-65.

7905* (Russian.) Determination of the Hydrogen Content of Titanium by Vacuum Heating. **Opredelenie soderzhaniia vodoroda v titane metodom vakuumnogo nagreva.** V. I. Lakomskii. *Avtomaticheskaia Svarka*, v. 11, no. 2, Feb. 1958, p. 81-91.

A new method for analyzing H in Ti. The coefficient of H diffusion in Ti is found.

7906 Application of Complexing Agents in the Photometric Determination of Zinc and Copper With Zincon. Robert H. Maier and J. Richard Kuykendall. *Chemist Analyst*, v. 47, Mar. 1958, p. 4 + 1 page.

7907 Determination of Phosphate in Uranium Ores, Concentrates and Liquors *Via* an EDTA Titration. K. F. Sporek. *Chemist Analyst*, v. 47, Mar. 1958, p. 12-13.

7908 (French.) On the Separation of Rare Earths by Means of Ethylenediamine Tetraacetate. **Sur la séparation des terres rares à l'aide de l'acide éthylènediamine-tétraacétique. V.** The Solubility Diagrams, NH_4[La-EDTA]–NH_4[Sm-EDTA]–H_2O and K[La-EDTA]–K[Sm-EDTA]–H_2O at 0° C. **Les diagrammes de solubilité NH_4[La-édta]—NH_4[Sm-édta]—H_2O et K[La-édta]—H_2O à 0°.** G. Brunisholz and R. Cahen. **VI.** The System, NH_4[Gd-EDTA]–NH_4[Y-EDTA]–H_2O at 0° C. **Le système NH_4[Gd-édta] — NH_4[Y-édta] — H_2O à 0°.** G. Brunisholz and M. Randin. *Helvetica Chimica Acta*, v. 41, no. 1, 1958, p. 188-199.

7909 (German.) Automatic Gas Chromatograph for the Preparative Separation of Mixtures of Organic Compounds. **Programmgesteuerter Gas - Chromatograph zur präparativen Trennung von Gemischen organischer Verbindungen.** E. Kováts, W. Simon, and E. Heilbronner. *Helvetica Chimica Acta*, v. 41, no. 1, 1958, p. 275-288.

Dependence of the separation efficiency on temperature, type of stationary phase, retention volume, flow rate of the carrier gas and amount of sample, and the conditions prevailing; separation of two component mixtures with and without overlapping peaks in their gas chromatogram.

7910* (French.) Systematic Testing of Various Methods of Micro-Titration of Iodine in Organic Combinations. **Critique expérimentale des différentes méthodes de microdosage de l'iode organique.** Alexis Konovalov. *Industrie Chimique Belge*, v. 23, no. 1, Jan. 1958, p. 19-34.

Critical study of the Grote-Krekeler and Schoeniger methods and others with proposed modifications.

7911* (Spanish.) Determination of Magnesium in Nodular Cast Iron. **Determinacion de magnesio en fundiciones nodulares. I.** Volumetric Method. **Metodo volumetrico. II.** Indirect Colorimetric Method. **Metodo colorimetrico indirecto. III.** Direct Colorimetric Method. **Metodo Colorimetrico directo.** Julian Bernal Nievas and Luis Serrano Berges. *Instituto del Hierro y del Acero*, v. 10, no. 54, Oct.-Dec. 1957, p. 389-401.

7912 Determining C, P and S in Steel. *Iron & Steel*, v. 31, no. 3, Mar. 1958, p. 101-102.

Use of a fluorite polychromator.

7913 A Vacuum Fusion Apparatus for Gas Analysis. P. D. Blake. *Iron and Steel Institute, Journal*, v. 188, pt. 3, Mar. 1958, p. 261-264.

Apparatus for determination of total and fractional O content of steel. Employs a compact type of split-graphite resistor.

7914 Differential Thermal Analysis of Organic Solids. M. C. P. Varma. *Journal of Applied Chemistry*, v. 8, pt. 2, Feb. 1958, p. 117-121.

By application of thermal analysis, melting and boiling points of the compounds were satisfactorily obtained and latent heats of fusion, based on the extent of the endothermic peak area of the melting reaction were evaluated.

7915* (Czech.) Determination of Mercaptan in Hydrocarbon Mixtures and in Gas. **Stanovení merkaptanů v uhlovodíkových směsích a v plynu.** J. Romováček and J. Bednář. *Paliva*, v. 38, no. 1, Jan. 1958, p. 9-12.

Presents three analytical methods for evaluation of fuel products: calorimetric method using *p*-dimethylamino aniline in presence of $FeCl_3$ oxidizing agent, potentiometric method, and amperemetric-titration method using $AgNO_3$.

7916* (Polish.) Separation of Nickel and Cobalt by Means of Ion-Exchangers. **Rozdzielenie niklu od kobaltu na wymieniaczach jonowych.** Maria Kozlicka and Barbara Stefańska. *Rudy i Metale Niezelazne*, v. 2, no. 4, Oct.-Dec. 1957, p. 117-122.

7917* (Polish.) Polarographic Determination of Impurities in Zinc and Its Alloys. **Polarograficzne oznaczenie zanieczyszczeń w cynku i jego stopach.** Stanisława Ziemba. *Rudy i Metale Niezelazne*, v. 2, no. 4, Oct.-Dec. 1957, p. 122-126.

7918* (German.) Spectrochemical Analysis of Gray Cast Iron. **Spektrochemische Analyse von Grauguss.** H. Moritz. Paper from Proceedings of the Colloquium Spectroscopicum Internationale VI. Amsterdam. May, 1956. *Spectrochimica Acta* (Supplement), 1957, p. 291-297.

Determination of Mn, Si, C in plain gray pig iron and of Cr, Cu, Mo, Ni in special gray pig iron. Excitation conditions. Influence of the electrode-gap in the determination of C. Recording and valuation of the spectra.

7919* (English.) **Determination of Reducing Sugars in Sulphite Waste Liquors.** Koichi Sato, Yoshihiro Matsumura, Kei Miyakawa, and Shinzo Yoshimura. *Svensk Papperstidning*, v. 61, no. 3, Feb. 15, 1958, p. 68-71.

A new technique is described for removing lignosulphonic acid prior to colorimetrically determining sugar in sulfite waste liquor. Complete precipitation of the lignosulfonic acid was achieved without interference in the subsequent use of colorimetric methods.

7920* (English.) **Rapid Determination of Small Amounts of Lead in Electrolytic Manganese and Ferromanganese.** Hidehiro Gotô and Kichinosuke Hirokawa. *Tôhoku University, Science Reports of the Research Institutes, Ser. A. Physics, Chemistry, Metallurgy*, v. 10, no. 1, Feb. 1958, p. 11-19.

The dithizone method was used.

7921 Trace Analysis. John H. Yoe and Henry J. Koch, Jr. 672 pp. 1957. John Wiley & Sons, New York. (QD101 Y74t)

Papers from a symposium covering analytical methods, instrumentation, sensitivity, separation, concentration, and contamination.

7922* (Russian.) Colorimetric Determination of Iron Carbide in Steels. **Kolorimetricheskoe opredelenie soderzhaniia karbida zheleza v staliakh.** N. M. Popova and L. V. Zaslavskaia. *Zavodskaia Laboratoriia*, v. 24, no. 1, 1958, p. 26-29.

A study of dried carbide depositions obtained from U8 steel that were annealed from 160 to 600 C.

7923* (Russian.) Thermoelectric Method for Determining the Amount of Carbon in Steel in the Course of Smelting. **Termoelektricheskii metod opredeleniia ugleroda v stali po khodu plavki.** P. D. Korzh and A. P. Ershova. *Zavodskaia Laboratoriia*, v. 24, no. 1, 1958, p. 41-43.

Samples of rimming steel were taken every 10-15 min. from the open-hearth furnace. Analysis was based on the fact that C is the only element that does not change quantitatively in the course of smelting.

7924* (German.) Contributions to the Analytical Chemistry of the Platinum Metals. **Beitrage zur analytischen Chemie der Platinmetalle. VII.** Microchemical Detection of Iridium, Palladium, and Platinum With Phosphonium and Arsonium Salts. **Der mikrochemische Nachweis des Iridiums, Palladiums und Platins mit Phosphonium- und Arsoniumsalzen.** Rolf Neeb. *Zeitschrift für Analytische Chemie*, v. 159, no. 6, 1958, p. 401-405.

Tetraphenylphosphonium c h l o r i d e, triphenylmethylarsonium chloride and (for Pd) tetraphenylarsonium chloride were used. The limits of determination were between 0.05 and 1μg metal in 0.05 ml solution.

7925* (German.) Determination of Vanadium in Pure Aluminum. **Bestimmung von Vanadium in Reinaluminium.** L. Erdey and F. Szabadváry. *Zeitschrift für Analytische Chemie*, v. 159, no. 6, 1958, p. 429-434.

One gram of Al is dissolved in HCl, the solution is oxidized with permanganate, the excess is eliminated with oxalic acid, the iron absorbed with EDTA, and Variamine Blue is added. Photometric examination reveals a coloration due to V exclusively.

7926* (German.) Determination of Metallic Impurities in Very Pure Antimony by the Dithizon Method. **Die Bestimmung von metallischen Verunreinigungen in ultrareinem Antimon mit Hilfe der Dithizonmethode.** Erich Häberli. *Zeitschrift für Analytische Chemie*, v. 160, no. 1, 1958, p. 15-20.

Simple and rapid method detects 0.00001 to 0.000001% foreign metal in 1 g of the sample. Reaction by means of Br. Solution of the resulting $SbBr_3$ and extractive titration.

7927* (German.) Simultaneous Flame Photometric Determination of Calcium, Strontium and Barium. **Die flammenphotometrische Bestimmung von Calcium, Strontium und Barium nebeneinander.** W. Schuhknecht and H. Schinkel. *Zeitschrift für Analytische Chemie*, v. 160, no. 1, 1958, p. 23-33.

The flame photometric method allows a simultaneous determination of the three alkalies even in extreme concentrations. The relative accuracy for a concentration ratio of 1:100 is under ±3% and for 1:1000 near ±5 to ±10%.

7928* (Czech.) Spectral Semi-Microanalysis of Welded Joints. **Spektrálna semimikroanalýza zváraných spojov.** Miroslav Síváček. *Zváranie*, v. 6, no. 12, Dec. 1957, p. 364-366.

The possibility of determining the localization, the quality and quantity of individual elements is much better by spectral analysis than by any other method.

See also: **7816** (determination of reactive MgO); **7858** (physical methods of analysis); **8105** (reciprocal effect of Na and K emission); **8106** (determination of Na in Al_2O_3); **8125** (microadsorption of U by $Fe(OH)_3$); **8152** (paint, lacquers, and varnish analysis); **8181** (process stream analysis by electrochemistry); **8321** (determination of oxygen in flames by N_2O); **8787** (preparation of carrier-free Sc^{48} and V^{48-49}).

CHEMISTRY—INORGANIC AND GENERAL

7929* (Romanian.) Complex Compounds of Antimony With Acridine. **Combinatii complexe ale stibiului cu acridina.** C. Dragulescu and I. Florea. *Academia Republicii Populare Romine. Baza de Cercetări Stiințifice Timișoara. Studii și Cercetări Științifice. Seria Științe Chimice*, v. 4, nos. 1-2, Jan.-June 1957, p. 9-13.

Acridine, a weak, monovalent base, forms with the complex ions SbX_4 and SbX_6, found in the acid solutions of antimony halogens, complex compounds of the type $SbX_4H \cdot Acr$ and $SbX_6H \cdot Acr$.

7930* (German.) Reactions of Formation of Nitroxy Chloride. **Bildungsreaktionen des Nitroxychlorids.** H. Martin. *Angewandte Chemie*, v. 70, no. 4, Feb. 21, 1958, p. 97-98.

Six methods of formation of the compound NO_3Cl from ClO_2 or Cl_2O with one of the nitrogen oxides NO_2 or N_2O_5 are reported.

7931 The Compound $CaO.Ti_2O_3$. Norman F. H. Bright, John F. Rowland, and Joseph G. Wurm. *Canadian Journal of Chemistry*, v. 36, Mar. 1958, p. 492-495.

By electrolyzing baths of molten $CaCl_2$ containing perovskite ($CaO.TiO_2$), a compound within the ternary Ca-Ti-O system, namely $CaO.Ti_2O_3$ was obtained. Crystallographic data were determined by X-rays.

7932 The Chemistry of Chromyl Compounds. Winslow H. Hartford and Marc Darrin. *Chemical Reviews*, v. 58, no. 1, Feb. 1958, p. 1-61.

A critical review covering preparation, properties and reactions.

7933 Stability Relationships Among Analogous Molecular Addition Compounds of Group III Elements. F. G. A. Stone. *Chemical Reviews*, v. 58, no. 1, Feb. 1958, p. 101-129.

7934 Thiocyanogen Chloride. I. Chemical Evidence for the Existence of the Monomeric Compound in Solutions in Organic Solvents. A. B. Angus and R. G. R. Bacon. **II. Some Physical Properties of Its Solutions.** R. G. R. Bacon and R. S. Irwin. *Chemical Society, Journal*, 1958, Feb., p. 774-784.

7935* (French.) Products of Anodic Oxidation of Dilute Solutions of Lead Acetate and Their Thermal Decomposition. **Produits d'oxydation anodique des solutions diluées d'acétate de plomb et leur décomposition thermique.** Laurent Seigneurin and Jean Brenet. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences*, v. 246, no. 8, Feb. 24, 1958, p. 1187-1189.

Conditions for producing the orthorhombic PbO_2 a variety; thermal decomposition; formation of a nonstoichiometric oxide $PbO_{2.12}$.

7936 (German.) Preparation of the Addition Compounds of Anhydrous Scandium Chloride and Scandium Bromide With Alcohols. **Über die Darstellung von Additionsverbindungen des wasserfreien Scandiumchlorids und Scandiumbromids mit Alkoholen.** F. Petrů, B. Hájek, and F. Jošt. *Croatica Chemica Acta*, v. 29, nos. 3-4, 1957, p. 457-460.

7937 The Infra-Red Spectra of Metal Acetylacetonates in the Sodium Chloride Region. Robert West and Reed Riley. *Journal of Inorganic and Nuclear Chemistry*, v. 5, no. 4, 1958, p. 295-303.

Spectra of 18 derivatives were studied.

7938 Ion Exchange Behaviour and Dissociation Constants of Americium, Curium, and Californium Complexes With Ethylenediaminetetra-Acetic Acid. J. Fuger. *Journal of Inorganic and Nuclear Chemistry*, v. 5, no. 4, 1958, p. 332-338.

7939 The Electrical Properties of Uranium Oxides. Robert K. Willardson, Jerry W. Moody, and Harvey L. Goering. *Journal of Inorganic and Nuclear Chemistry*, v. 6, no. 1, Feb. 1958, p. 19-33.

The electrical conductivity and thermoelectric power of uranium oxides in the UO_2-U_3O_7 range were studied at temperatures between 27 and 400 C after annealing at elevated temperatures. The following compounds were identified: UO_{2+x}, a metal-deficit semiconductor; U_4O_{9-y}, a metal-excess semiconductor; and U_3O_{7-z}, a metal-excess semiconductor. The presence of all major phases was confirmed by X-ray powder techniques.

7940 (Serbian.) The Peroxy-Compound of Lead. **O iednom peroksi-iedineniu olova.** A. M. Leko and V. J. Rekalich. *Khemisko Drushtva Beograd, Glasnik*, v. 22, no. 4, 1957, p. 193-199.

Preparation, starting with $Pb(NO_3)_2$ and Na_2CO_3 in the presence of H_2O_2, of a compound with the approximate composition $7PbO \cdot 5CO_2 \cdot 2O$.

7941* (Russian.) The Crystal Structure of Ruthenium Trichloride. **Kristallicheskaia struktura trikhlorida ruteniia.** E. V. Stroganov and K. V. Ovchinnikov. *Leningrad. Universitet. Vestnik*, v. 12, no. 22, 1957, p. 152-157.

The crystal structure of $RuCl_3$ (black modification, formation temperature 600-800 C) was determined by Fourier's series. The substance is isomorphous with the violet modification of $CrCl_3$ obtained at 600-800 C. The ion radius of Ru^{+3} was measured.

7942* Chemical Techniques Used in Connection With β-Spectroscopic Work on Rare Earth Elements. P. Gregers Hansen and R. K. Sheline. *Nuclear Instruments*, v. 2, Jan. 1958, p. 39-43.

Cyclotron target preparation, chemical separation by ion exchange chromatography, and source preparation are described.

7943 Radiochemical Studies of Mercury and Its Ions in Dilute Solutions. Herbert C. Moser and Adolf Voigt. *U. S. Atomic Energy Commission*, ISC-892, Mar. 1957, 65 pp. (UF 767 Un3.1is Contin.)

Radioactive Hg-203 was used to study the properties of the mercurous ion, the solubility of Hg metal, and HgI_2-iodide ion equilibria.

7944 The Preparation of Di-Deutero Sulfuric Acid. R. H. Shudde. *U. S. Atomic Energy Commission*, NAA-SR-2158, Mar. 1, 1958, 7 pp. (UF767 Un3.1na Contin.)

Pure D_2SO_4 can be produced continuously and inexpensively by bubbling SO_3 vapor, diluted with He, through D_2O.

7945* (German.) The Fluorine-Containing Compounds of the Elements in the Fifth Main Group. **Über fluorhaltige Verbindungen der Elemente der V. Hauptgruppe. V.** Hydroxyfluoroantimonates(V). **Über Hydroxofluoroantimonate (V).** Lothar Kolditz and Dieter Sarrach. **VI.** The Bond Isomerism of Mixed Phosphorus(V) Halides. **Über Bindungsisomerie bei gemischten Phosphor(V)-halogeniden.** Lothar Kolditz. **VII.** Tetrabromophosphorus (V) - hexafluorophosphate $[PBr_4][PF_6]$. **Tetrabromophosphor(V)-hexafluorophosphat, $[PBr_4][PF_6]$.** Lothar Kolditz and Adalbert Feltz. **VIII.** Fluoroarsenates. **Über Fluoroarsenate.** Lothar Kolditz and Walter Röhnsch. *Zeitschrift für Anorganische und Allgemeine Chemie*, v. 293, nos. 3-4, Dec. 1957, p. 132-194.

7946* (German.) Melted Antimony(III) Bromide as Ionizing Solvent and Behavior of the Substances Dissolved in It. **Geschmolzenes Antimon(III)-bromid als ionisierendes Lösungsmittel und das Verhalten darin gelöster Substanzen. I.** Gerhart Jander and Josef Weis. *Zeitschrift für Elektrochemie*, v. 61, no. 10, 1957, p. 1275-1283.

Many inorganic and organic substances are dissolved by melted $SbBr_3$ and crystallize with it as double compounds. Electrical conductivity. Production of Br-ions.

See also: **8351** (solubility of NaCl in superheated stream); **8363** (stoichiometric formula index).

CHEMISTRY—ORGANIC

7947 Dinickel Phosphide as a Heterogeneous Catalyst for Vapor Phase Reduction of Nitrobenzene With Hydrogen to Aniline and Water. Norman P. Sweeny, Charles S. Rohrer, and O. W. Brown. *American Chemical Society, Journal*, v. 80, Feb. 20, 1958, p. 799-800.

Yields of over 95 wt. % aniline were obtained under optimum conditions.

7948 The Stability of Metal Chelates of Compounds Related to Anthranilic Acid. Allen Young and Thomas R. Sweet. *American Chemical Society, Journal*, v. 80, Feb. 20, 1958, p. 800-803.

The acidity constants of anthranilic acid, N-methylanthranilic acid, 2,2'-iminodibenzoic acid, 2,2'-hydrazodibenzoic acid, N,N'-methylenedianthranilic acid, N,N'-trimethylenedianthranilic acid, N-(2-aminoethyl)-anthranilic acid, α-amino-*o*-toluic acid, α-carboxy-*o*-anisic acid, N-(carboxymethyl)-anthranilic acid, and N,N-bis-(carboxymethyl), anthranilic acid were determined in 1:1 volume water-dioxane and the stabilities of the chelate compounds Co, Ni, Cu, Zn, and Cd with each of these acids were obtained.

7949 The Infrared Spectra of Some Derivatives of 1,3,5-Triazine. W. M. Padgett, II and W. F. Hamner. *American Chemical Society, Journal*, v. 80, Feb. 20, 1958, p. 803-808.

Data on 35 derivatives using solid samples dispersed in alkali halide disks.

7950 Organic Disulfides and Related Substances. I. Oxidation of Thiols to Disulfides With Lead Tetraacetate. Lamar Field and John E. Lawson. *American Chemical Society*, Journal, v. 80, Feb. 20, 1958, p. 838-841.

7951 Thermal Syntheses of Telomers of Fluorinated Olefins. II. 1,1-Difluoroethylene. Murray Hauptschein, Milton Braid, and Francis E. Lawlor. **III. Perfluoropropene Telomer Bromides.** Murray Hauptschein, Milton Braid, and Arnold H. Fainberg. *American Chemical Society, Journal*, v. 80, Feb. 20, 1958, p. 846-853.

7952 5-Phenyl-2-penten-4-yn-1-ol and Related Compounds. Thomas L. Jacobs, David Dankner, and Arlyn R. Dankner. *American Chemical Society, Journal*, v. 80, Feb. 20, 1958, p. 864-866.

Synthesis from sodium phenylacetylide and epichlorohydrin, with α-benzylfuran as a by-product. The alcohol was oxidized to the corresponding aldehyde and acid; the latter was cyclized to phenylcoumalin.

7953 Sterol Models. II. 4a-Methyl-*cis*- and -*trans*-Decahydronaphthalenes and Their 4a-Methyl-d_3 Analogs. Martin Idelson and Ernest I. Becker. *American Chemical Society, Journal*, v. 80, Feb. 20, 1958, p. 908-915.

Syntheses and spectral studies.

7954 The Anomalous Behavior of Tetrazolediazonium Chloride Toward Some Arylhydrazines: The Synthesis of Some 3,5-Diaryl-1-(5'-tetrazolyl) (1H) tetrazolium Betaines. III. Jerome P. Horwitz and Vytautas A. Grakauskas. *American Chemical Society, Journal*, v. 80, Feb. 20, 1958, p. 926-930.

7955 The Hydrolytic Instability of the Aldonamides. M. L. Wolfrom, R. B. Bennett, and J. D. Crum. *American Chemical Society, Journal*, v. 80, Feb. 20, 1958, p. 944-946.

The aldonamides are unstable in dilute aqueous solution at room temperature. When properly purified, they may show an apparent stability for many hours but eventually will exhibit an abrupt polarimetric change. The product of the reaction is the ammonium salt of the aldonic acid.

7956 The Controlled Thermal Decomposition of Cellulose Nitrate. III. M. L. Wolfrom, Alan Chaney, and P. McWain. *American Chemical Society, Journal*, v. 80, Feb. 20, 1958, p. 946-950.

7957 3-Sulfanilamido-6-alkoxypyridazines and Related Compounds. J. H. Clark, et al. *American Chemical Society, Journal*, v. 80, Feb. 20, 1958, p. 980-983.

3-Sulfanilamido-6-chloropyridazine when reacting with the Na derivatives of various alcohols or phenol gave the corresponding ethers. Related derivatives of 3-sulfanilamido-4- and 5-methylpyridazine also were prepared.

7958 Syntheses and Infrared Spectra of α,β-Unsaturated-β-ketoamines and Their Copper Chelates. Henry F. Holtzclaw, Jr., James P. Collman, and Richard M. Alire. *American Chemical Society, Journal*, v. 80, Mar. 5, 1958, p. 1100-1103.

7959 Condensation of Aldehydes and Ketones With Reissert Compounds. Lee R. Walters, N. Thanukrishna Iyer, and William E. McEwen. *American Chemical Society, Journal*, v. 80, Mar. 5, 1958, p. 1177-1181.

The Li salts of Reissert compounds undergo reaction with aldehydes to form LiCN and esters of secondary alcohols containing the 2-quinolyl or 1-isoquinolyl group bonded to the carbinol C atom.

7960 Polymeric Phthalocyanines. C. S. Marvel and John H. Rassweiler. *American Chemical Society, Journal*, v. 80, Mar. 5, 1958, p. 1197-1199.

Low mol. wt. soluble polymeric phthalocyanines were prepared from mixtures of pyromellitic acid and phthalic anhydride and of 3,3',4,4'-tetracarboxydiphenyl ether and phthalic anhydride. The polymers are dark blue-green to black powders with fair heat stability.

7961 Detection and Structural Analysis of Furans by Proton Magnetic Resonance. E. J. Corey, et al. *American Chemical Society, Journal*, v. 80, Mar. 5, 1958, p. 1204-1206.

Measurements show that proton magnetic resonance spectroscopy is a powerful tool for detecting furan rings and locating attached substituents.

7962* (Russian.) Alkylation of Benzene Derivatives in the Presence of Metallic Aluminum. **Alkilirovanie proizvodnykh benzola v prisutstvii metallicheskogo aluminiia.** V. D. Azatian. *Akademiia Nauk Armianskoi SSR, Doklady*, v. 25, no. 5, 1957, p. 235-242.

Alkylation of chloro- and bromo-benzenes, phenol, anisole, and phenetole with the alkyl halides; 1,3-dichloro-2-butene, butyl bromide, and benzyl chloride.

7963* (Russian.) On the Possibility of Catalytic Dehydration of the Silicon Hydrocarbons. **O vozmozhnosti kataliticheskogo degidrirovaniia kremneuglevodorodov.** B. N. Dolgov, G. V. Golodnikov, and K. G. Golodova. *Akademiia Nauk SSSR, Doklady*, v. 117, no. 6, Dec. 21, 1957, p. 987-989.

Dehydration of the mixed tetralkylsilanes. Trimethylbutylsilane at 550 to 575 C yields from 6.2 to 8.6% of trimethylbutenylsilane.

7964* (Russian.) Influence of the Gas Mixture Composition on the Yield of Carbonyl Compounds in the Oxidation of Propylene Over Copper Catalyst. **O vliianii sostava gazovoi smesi na vykhod karbonil'nykh soedinenii v reaktsii okisleniia propilena nad mednym katalizatorom.** N. I. Popova, R. N. Stukova, and E. E. Vermel'. *Akademiia Nauk SSSR, Doklady*, v. 117, no. 6, Dec. 21, 1957, p. 1000-1002.

Decrease of 0 in the gas increases the yield of carbonyl compounds. The best ratio of propylene to 0 is 10:1, giving yields from 25.5 to 32.4%.

7965* (Russian.) Preparation of Xylols by Dealkylation and Conjugated Alkylation of Aromatic Hydrocarbons in the Presence of Synthetic Aluminosilicates. **Poluchenie ksilolov dealkilirovaniem i sopriazhennym alkilirovaniem aromaticheskikh uglevodorodov v prisutstvii sinteticheskikh aliumosilikatov.** A. V. Topchiev and G. M. Mamedaliev. *Akademiia Nauk SSSR, Doklady*, v. 117, no. 6, Dec. 21, 1957, p. 1007-1009.

7966 (Russian.) Interaction of Magnesium-Organic Compounds With 2-Bromodihydroresorcinol. **Vzaimodeistvie magniiorganicheskikh soedinenii s 2-bromdigidrorezortsinom.** I. N. Nazorov and S. I. Zavialov. *Akademiia Nauk SSSR, Izvestiia, Otdelenie Khimicheskikh Nauk*, 1958, no. 2, Feb., p. 200-203.

2-Methyl- and 2-ethyl-1-bromo-△-cyclohexenones are products of this reaction. Upon distillation in vacuum the latter lose their HBr and become metasubstituted phenols.

7967* (German.) Formation of Complexes and Reactivity in Organometallic Chemistry. **Komplexbildung und Reaktivität in der metallorganischen Chemie.** G. Wittig. *Angewandte Chemie*, v. 70, no. 3, Feb. 7, 1958, p. 65-71.

Formation of organometallic complexes. Comparison between the "ate complexes" with their specific reactivity and the "onium-complexes". Polymerizations stopped via ate-complexes.

7968* (German.) Silicon Containing Amino Acid Derivatives. **Siliciumhaltige Aminosäurederivate.** Leonhard Birkofer and Alfred Ritter. *Annalen der Chemie (Justus Liebig's)*, v. 612, nos. 1-3, Mar. 1958, p. 22-23.

The reaction of trimethylchlorosilane with amino acid esters results in formation of silazan carboxyl acid esters. Thus, the ethyl esters of *N*-trimethylsilylglycine, *dl*-norvaline, *l*-leucine, *β*-alanine, and *dl*-*β*-aminobutyric acid were prepared.

7969* (German.) Addition of Alkali Metals to Pyrene. **Die Addition von Alkalimetall an Pyren. II.** Otto Neunhoeffer, Heinz Woggon, and Siegfried Dähne. *Annalen der Chemie (Justus Liebig's)*, v. 612, nos. 1-3, Mar. 1958, p. 98-102.

Reduced by the Birch method, pyrene produces 3,8- or 3,10-dihydropyrene.

7970* (German.) Mechanism of the *cis-trans* Catalytic Reaction of Azobenzene. **Über den Mechanismus der katalytischen *cis* → *trans*- Umlagerung von Azobenzol.** Dietrich Schulte-Frohlinde. *Annalen der Chemie (Justus Liebig's)*, v. 612, nos. 1-3, Mar. 1958, p. 131-138.

7971* (German.) Thermal- and Catalytic *cis-trans* Reaction of Substituted Azobenzenes. **Über die thermische und katalytische *cis* → trans-Umlagerung substituierter Azobenzole.** Dietrich Schulte-Frohlinde. *Annalen der Chemie (Justus Liebig's)*, v. 612, nos. 1-3, Mar. 1958, p. 138-152.

7972* (German.) Investigations in the Pyrimidine Series. **Untersuchungen in der Pyrimidinreihe. IV.** Reactions With 1,3-Dimethyl-4-chlorouracil. **Umsetzungen mit 1.3-Dimethyl-4-chlor-uracil. V.** Acetylation of 4-Amino-6-oxo-dihydropyrimidines. **Acetylierungen von 4-Amino-6-oxo-dihydropyrimidinen. VI.** Acetylation of 4-Aminouracils. **Über Acylierungen von 4-Amino-uracilen. VII.** 5-Aminouracils and Their Acetyl Derivatives. **Über 5-Amino-uracile und ihre Acetylderivate.** Wolfgang Pfleiderer, et al. *Annalen der Chemie (Justus Liebig's)*, v. 612, nos. 1-3, Mar. 1958, p. 158-186.

7973 Organic Deuterium Compounds. XIX. Synthesis of Some Deuterated Laurie Acids and Their Methyl Esters. M. Elaine Isabelle and L. C. Leitch. *Canadian Journal of Chemistry*, v. 36, Mar. 1958, p. 440-448.

7974 Synthesis of Some Hexanediols. E. von Rudloff. *Canadian Journal of Chemistry*, v. 36, Mar. 1958, p. 486-491.

Preparation of a corresponding ketohexanoate, which is reduced to the diol with $LiAlH_4$. Countercurrent distribution purified small amounts of intermediates and end products.

7975 2,4-Oxazolidinediones. J. W. Clark-Lewis. *Chemical Reviews*, v. 58, no. 1, Feb. 1958, p. 63-99.

Preparation, properties, and uses.

7976 Melamine and Derivatives of Melamine. Bernard Bann and Samuel A. Miller. *Chemical Reviews*, v. 58, no. 1, Feb. 1958, p. 131-172.

Preparation, properties, reactions, and uses.

7977 Mesomorphism and Chemical Constitution. X. The 2-*p*-*n*-Alkoxybenzylideneaminophenanthrenes and Evidence for the Planarity of the Diphenyl Ring System in the Mesomorphic State. G. W. Gray. *Chemical Society, Journal*, 1958, Feb., p. 552-555.

Thirteen anils derived from *p*-*n*-alkoxybenzaldehydes and 2-amino-phenanthrene were prepared and their mesomorphic properties studied.

7978 Chaksine. I. Ahmad Kamal and Georg Hahn. *Chemical Society, Journal*, 1958, Feb., p. 555-557.

Suggests that chaksine, $C_{11}H_{21}O_2N_3$, has a guanidine structure, which accounts for the N.

7979 Alicyclic Diketones and Diols. I. *cis*- and *trans*-2:2:5:5-Tetramethylcyclohexane-1:3-diol. A. W. Allan, R. P. A. Sneeden, and J. Colvin. *Chemical Society, Journal*, 1958, Feb., p. 557-559.

Preparation and properties.

7980 The Reaction of Methyldisiloxanes and 1:1-Dimethyldisilthiane With Boron and Hydrogen Halides. H. J. Emeléus and M. Onyszchuk. *Chemical Society, Journal*, 1958, Feb., p. 604-609.

Cleavage of the Si-O-Si bond occurs with formation of methylhalogenosilane and the methylsiloxyboron dihalide, which decomposes spontaneously to the methylhalogenosilane, boron trihalide, and boron trioxide.

7981 Preparation and Properties of Dimethyliodosilane, 1:1':2:2'-Tetramethyl-Disiloxane and -Disilthiane. H. J. Emeléus and L. E. Smythe. *Chemical Society, Journal*, 1958, Feb., p. 609-611.

7982 Studies in the Synthesis of Terpenes. III. The Synthesis of 6-Acetoxy-5:5:9-trimethyl-*trans*-decal-1-one. B. Gaspert, T. G. Halsall, and D. Willis. *Chemical Society, Journal*, 1958, Feb., p. 624-628.

7983 Mechanism and Stereochemistry of the Addition of Nitrogen Dioxide to Olefins. J. C. D. Brand and I. D. R. Stevens. *Chemical Society, Journal*, 1958, Feb., p. 629-638.

7984 Ferrocene Derivatives. IV. Indenyl- and Tetrahydroindenyl-Iron Carbonyls. B. F. Hallam and P. L. Pauson. **V. Ferrocenealdehyde.** G. D. Broadhead, J. M. Osgerby, and P. L. Pauson. **VI. *DL*-Ferrocenylalanine.** J. M. Osgerby and P. L. Pauson. *Chemical Society, Journal,* 1958, Feb., p. 646-600.

Syntheses, properties, and reactions.

7985 Physicochemical Studies on Starches. IX. The Mechanism of the β-Amylolysis of Amylose and the Nature of the β-Limit Dextrin. J. M. G. Cowie, I. D. Fleming, C. T. Greenwood, and D. J. Manners. **X. The Molecular Weight of the Water-Soluble Polysaccharides of Sweet Corn, *Zea mays*. XI. The Granular Starch of Sweet Corn, *Zea mays*.** C. T. Greenwood and P. C. Das Gupta. **XII. The Molecular Weight of Glycogens in Aqueous Solution.** W. A. J. Bryce, C. T. Greenwood, I. G. Jones, and D. J. Manners. *Chemical Society, Journal,* 1958, Feb., p. 697-715.

7986 Tetrahedral Nickel(II) Complexes and the Factors Determining Their Formation. I. Bistriphenylphosphine Nickel(II) Compounds. L. M. Venanzi. *Chemical Society, Journal,* 1958, Feb., p. 719-724.

Preparation and properties of $(Ph_3P)_2NiX_2$ (X=Cl, Br, I, NO_3, or SCN).

7987 Carcinogenic Nitrogen Compounds. XXIV. The Synthesis of Indole and Quinoline Compounds From Cyclic Ketones. Ng. Ph. Buu-Hoi, P. Jacquignon, and T. B. Loc. *Chemical Society, Journal,* 1958, Feb., p. 738-740.

Indole, benzindole, and quinoline compounds fused to an 8-, 9-, or 10-membered *cyclo*alkene ring were synthesized by the Fischer and the Pfitzinger reaction from *cyclo*octanone, *cyclo*nonanone, and *cyclo*decanone.

7988 The Reaction of Ninhydrin With Cyclic α-Imino-Acids. A. W. Johnson and D. J. McCaldin. *Chemical Society, Journal,* 1958, Feb., p. 817-822.

Structures are proposed for the yellow and the purple condensation products. Ring size has a marked influence on the course of the reaction.

7989 The Alkylation of Mercaptobenzothiazole. K. J. Morgan. *Chemical Society, Journal,* 1958, Feb., p. 854-858.

Formation of anomalous products is explained by thermal dissociation. Structure and spectra of the corresponding acid salts of 2-alkylthiobenzothiazoles are discussed.

7990* (French.) Condensation of Fluorene With Acetic Anhydride in the Presence of Boron Trifluoride. A New Benzoylacetone Isolog: Fluoroyl-(2)Acetone. **Condensation du fluorène avec l'anhydride acétique en présence du trifluorure de bore. Un nouvel isologue de la benzoylacétone: la fluoroyl-(2)acétone.** Modeste Martynoff. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences,* v. 246, no. 7, Feb. 17, 1958, p. 1057-1060.

Compound has the characteristic properties of β-diketones.

7991* (French.) A New Method for Preparing Composite Organozincs. **Sur une nouvelle méthode de préparation des organozinciques mixtes.** Marcel Gaudemar. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences,* v. 246, no. 8, Feb. 24, 1958, p. 1229-1231.

α-Acetylene-, α-ethylene-, and α-phenyl bromides attack Zn in Tetrahydrofurans with production of solvated R-Zn-Br reagents. The same reaction is obtained starting from ethyl iodide or isopropyl bromide.

7992* (French.) Preparation of Polymethyl Allyl Alcohol by Polymethyl Methacrylate Reduction. **Préparation d'alcool polyméthylallylique par réduction du polyméthacrylate de méthyle.** Jean Petit and Bertrand Houel. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences,* v. 246, no. 9, Mar. 3, 1958, p. 1427-1429.

Reduction of polymethyl methacrylate with $LiAlH_4$. Analysis of the polymethyl allyl alcohol produced and of its acetylene derivative.

7993 (English.) **Pseudoconhydrine; Direct Correlation of the Configuration of C(2) With That of α-Amino Acids.** K. Balenović and N. Stimac. *Croatica Chemica Acta,* v. 29, nos. 3-4, 1957, p. 153-156.

(+)-β-Amino-*n*-caproic acid, obtained by oxidation of pseudoconhydrine, was prepared by stereospecific synthesis from L-norvaline and the structure established.

7994 (French.) Partial Synthesis of Labdanolic Acid From Sclareol. **Synthèse partielle de l'acide labdanolique à partir du sclaréol.** Sonia Bory and Edgar Lederer. *Croatica Chemica Acta,* v. 29, nos. 3-4, 1957, p. 157-161.

7995 (English.) **The Chemistry of the Triterpenes and Related Compounds. XXXII. The Chemistry of Hydroxyhopanone.** W. J. Dunstan, H. Fazakerley, T. G. Halsall, and E. R. H. Jones. *Croatica Chemica Acta,* v. 29, nos. 3-4, 1957, p. 173-182.

The functional groups of hydroxyhopanone, a saturated $C_{30}H_{50}O_2$ pentacyclic triterpene keto-alcohol, are characterized and a tentative structure proposed.

7996 (German.) A Contribution to the Structure of Lignin. **Beiträge zur Struktur des Lignins.** Karl Freudenberg. *Croatica Chemica Acta,* v. 29, nos. 3-4, 1957, p. 189-194.

Reviews progress in lignin chemistry.

7997 (English.) **Synthesis of Azulenoids From Troponoids.** Tetsuo Nozoe. *Croatica Chemica Acta,* v. 29, nos. 3-4, 1957, p. 207-227.

Different syntheses of azulene derivatives are discussed. The reaction of 2-halotropone and tropolone methylether with guanidine, thiourea, malonic ester, and cyanoacetic ester resulted in a cyclization to a five membered-ring.

7998 (German.) The Constitution of Sinogenin. Glycosides and Aglycones. **Die Konstitution von Sinogenin. Glykoside und Aglykone.** O. Renkonen, O. Schindler, and T. Reichstein. *Croatica Chemica Acta,* v. 29, nos. 3-4, 1957, p. 239-245.

By degradation of sinogenin to 3β, 11α-diacetoxy-12-ketoetianic acid methyl ester, the constitution of this genin is proven as 3β, 11α, 14-trihydroxy-12-ketocarden-(20:20)-olide.

7999 (French.) Bis-Hydroperoxides of Steroids. **Bis-hydroperoxydes stéroïdes.** Léon Velluz, et al. *Croatica Chemica Acta,* v. 29, nos. 3-4, 1957, p. 255-262.

Prepared by action of H_2O_2 on 3- and 20-ketosteroids.

8000 (German.) The Chemistry of Sesquiterpenes and Azulenes. **Zur Kenntnis der Sesquiterpene und Azulene. CXXIII.** The Conversion of Elemol in Eudesman. **Überführung von Elemol in Eudesman.** W. Wicki, J. Kalvoda, and O. Jeger. *Croatica Chemica Acta,* v. 29, nos. 3-4, 1957, p. 263-268.

8001 (English.) **The Preparation of Aryl Thioethers by Reaction of Aromatic Halogen Compounds With Cuprous Thiophenolate or Cuprous Thiobutylate.** Roger Adams, Walter Reifschneider, and M. D. Nair. *Croatica Chemica Acta,* v. 29, nos. 3-4, 1957, p. 277-285.

The reaction of cuprous thiophenolate with an aryl halide in a mixture of quinoline and pyridine appears to be a general method for obtaining aryl thioethers.

8002 (French.) Hydroxy Ketones Having Protective Effects Against Lethal Radiations. **Hydroxyeétones possédant une activité protectrice contre les effets des radiations léthales.** N. P. Buu-Hoi and Denise Lavit. *Croatica Chemica Acta,* v. 29, nos. 3-4, 1957, p. 287-290.

Preparation of some higher aliphatic and alicyclic acids, with pyrogallol and α-naphthol. *o*-Hydroxy ketones obtained show protective influence against lethal X-rays.

8003 (German.) Thiofuroic Acid Amides. **Über Thiobrenzschleimsäureamide. I.** Thioamides. **Thioamide.** V. Hahn, et al. *Croatica Chemica Acta,* v. 29, nos. 3-4, 1957, p. 319-327.

Preparation of thiofuroic acid amide, ten *n*-monosubstituted and six *N,N*-disubstituted amides of thiofuroic acid. Good yields of all thioamides were obtained by treating the corresponding amides with P_2S_5 in pyridine.

8004 (German.) Structural and Steric Course of Organometallic Reactions on Diene-Adducts of 1,4-Naphthoquinones. **Struktureller und sterischer Verlauf metallorganischer Reaktionen an Dien-Addukten von 1,4-Naphthochinonen.** H. H. Inhoffen, H. Muxfeldt, H. Schaefer, and H. Krämer. *Croatica Chemica Acta,* v. 29, nos. 3-4, 1957, p. 329-345.

Investigation of reactions on diene-adducts of 1-acetoxybutadiene and 1,4-naphthoquinone with juglone.

8005 (German.) Syntheses in the Pyrrolizidine and Indolizidine Series. **Synthesen in der Pyrrolizidin- und Indolizidin-Reihe.** R. Seiwerth and S. Djokić. *Croatica Chemica Acta*, v. 29, nos. 3-4, 1957, p. 403-407.

Bromination of 4-(tetrahydro-2-furyl)-butyric acid and 5-(tetrahydro-2-furyl)-valeric acid with Br and red P and subsequent reaction with methanol gave the corresponding esters of α-bromo acids. Further treatment resulted in 3-hydroxymethylpyrrolizidine and 5-hydroxymethyl-indolizidine.

8006* (Italian.) New Synthetic Iodo-Organic Substances. Synthesis of 6-Iodo-4-oxycoumarin and of 6,6′-Diiododicoumarol. **Nuovi iodo-organici di sintesi. Sintesi della 6-iodo-4-ossicumarina e del 6,6′-diiododicumarolo.** Mario Covello and Eugenio Piscopo. *Gazzetta Chimica Italiana*, v. 88, no. 1, Jan. 1958, p. 101-112.

Synthesis of 6,6′-diiododicoumarol by condensation with formic aldehydes of 6-iodo-4-hydroxycoumarin. A new ketone, 2-oxy-5-iodo-acetophenone, was also obtained from the 6-iodo-4-hydroxycoumarin.

8007 (German.) Reductions With $LiAlH_4$ in the Isatin Series. **Reduktionen mit $LiAlH_4$ in der Isatin-Reihe. III.** Production of N-Methyl-3-hydroxy-indolin. **Zur Darstellung von N-Methyl-3-hydroxy-indolin.** E. Giovannini and Th. Lorenz. *Helvetica Chimica Acta*, v. 41, no. 1, 1958, p. 113-118.

The reduction of N-methylisatin, N-methyldioxindole, N-formylindoxyl, and N-methyl-β-isatoxime with $LiAlH_4$ led to N-Methylindole and the leuco-compounds of dyes of the indigo series.

8008 (German.) A Study of the Synthesis of Pseudoionone According to *Kimel* and *Sax*. **Zur Kenntnis der Pseudojononsynthese nach *Kimel & Sax*.** G. Saucy, L. H. Chopard-dit-Jean, W. Guex, G. Ryser, and O. Isler. *Helvetica Chimica Acta*, v. 41, no. 1, 1958, p. 160-169.

In the synthesis of pseudoionone by pyrolysis of dehydrolinalyl-aceto-acetate an isomeric ketone is formed, the structure of which was elucidated by degradation to *dl*-puleganic acid.

8009* (Russian.) Preparation and Properties of Some Alkylsilanedeuterides. **Poluchenie i svoistva nekotorykh alkilsilandeiteridov.** V. A. Ponamorenko, Iu. P. Egorov, and G. Ia. Vzenkova. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk*, 1958, no. 1, Jan., p. 54-58.

Alkylsilanedeuterides can be prepared from corresponding alkylsilanechlorides by reduction of the latter with LiD. Five new compounds are reported.

8010 The Chemistry of Some 8-Hydroxyquinoline Complexes of Vanadium. A. J. Blair, D. A. Pantony, and G. J. Minkoff. *Journal of Inorganic and Nuclear Chemistry*, v. 5, no. 4, 1958, p. 316-331.

Reactions with alcohols, thiols, and amines in the pure state and in inert organic solvents, and with HCl in dilute *o*-dichlorobenzene solution are examined.

8011 Total Synthesis of Pseudoionone and an Isomeric Ketone. Walter Kimel, et al. *Journal of Organic Chemistry*, v. 23, Feb. 1958, p. 153-157.

Key step is a pyrolytic rearrangement of a disubstituted propargyl acetoacetate (dehydrolinalyl acetoacetate).

8012 Synthesis of 17 α, 20 α-Dihydroxysteroids. David K. Fukushima and Evelyn D. Meyer. *Journal of Organic Chemistry*, v. 23, Feb. 1958, p. 174-179.

Preparation by the $LiAlH_4$ reduction of 17 α, 20 β-epoxy-20, α-acetoxy-steroids.

8013 A New Method for Preparation of Dialkylaminostyryl Derivatives of Pyridine and Quinoline and Their *N*-Oxides. Elizabeth D. Parker and Arthur Furst. *Journal of Organic Chemistry*, v. 23, Feb. 1958, p. 201-203.

Ten new nitrogen heterocyclic dialkylaminostyryl derivatives were prepared by condensing the appropriate *p*-dialkylaminobenzaldehyde with the active methyl group of picoline, quinaldine, or 2-methylquinoxaline.

8014 Condensations of Benzhydryl Methyl Ether Involving α-Hydrogen by Potassium Amide. Cyclization of Conjugate Addition Product by Polyphosphoric Acid. Charles R. Hauser and Marvin T. Tetenbaum. *Journal of Organic Chemistry*, v. 23, Feb. 1958, p. 233-235.

8015 Oxidation and Characterization of α,α′-Dichloro-*p*-xylene. Irving S. Bengelsdorf. *Journal of Organic Chemistry*, v. 23, Feb. 1958, p. 242-246.

The major products of oxidation with dilute HNO_3 at atmospheric pressure, are terephthalaldehyde and terephthalaldehydic acid.

8016 Thermal Decomposition of Crystalline *tert*-Butyl *N*-Methyl-*N*-(*p*-nitrophenyl)peroxycarbamate. C. J. Pedersen. *Journal of Organic Chemistry*, v. 23, Feb. 1958, p. 255-261.

8017 The Chemistry of Oxamidines. I. Henry M. Woodburn and Warren E. Hoffman. *Journal of Organic Chemistry*, v. 23, Feb. 1958, p. 262-268.

Salts and metal complexes of oxamidines. Behavior toward the action of acylating agents and bifunctional compounds.

8018 Diphenyltriketone-Benzoin Rearrangement in an Acidic Medium. A. Schönberg and R. C. Azzam. *Journal of Organic Chemistry*, v. 23, Feb. 1958, p. 286-287.

Formation of benzoin and benzil; reaction mechanism.

8019 Synthesis and Intramolecular Rearrangements of Chloromethylpentamethyldisilane and 1-Chloromethyl-2-chlorotetramethyldisilane. Makoto Kumada, Jun-Ichi Nakajima, Mituo Ishikawa, and Yoshihiro Yamamoto. *Journal of Organic Chemistry*, v. 23, Feb. 1958, p. 292-295.

8020* (Russian.) Alkylation of Naphthalene With Isobutyl and Isoamyl Alcohols in the Presence of $H_3PO_4 \cdot BF_3$ Catalyst. **Alkilirovanie naftalina izobutilovym i izoamilovym spirtami v prisutstvii katalizatora $H_3PO_4 \cdot BF_3$.** I. A. Romadan and L. Lauberte. *Latvijas PSR Zinātnu Akademijas Vestis*, 1957, no. 12, p. 151-154.

Alkylation at 155-160 C produced β-tertiary butyl- and β-tertiary amylnaphthalenes; dialkyl substitutes formed at the same time.

8021 A Two-Step Synthesis of Allenes From Olefins. W. von E. Doering and P. M. LaFlamme. *Tetrahedron*, v. 2, nos. 1/2, 1958, p. 75-79.

The first step involves addition of dibromacarbene to an olefin; reaction of the resulting substituted 1,1-dibromo*cyclo*propane with Mg or Na follows.

8022 The Synthesis of Aromatic A Ring 9//10-Secosteroids From Unsaturated 3,11-Diketo Steroids. Barney J. Magerlein and John A. Hogg. *Tetrahedron*, v. 2, nos. 1/2, 1958, p. 80-87.

8023 Intermediate for Steroid Syntheses. S. Swaminathan and M. S. Newman. *Tetrahedron*, v. 2, nos. 1/2, 1958, p. 88-99.

Synthesis of 1-acetyl-6-oxo-8a-methyl-3,4,6,7,8,8a-hexahydronaphthalene.

8024 Occlusion of Alkylsilanes by Urea. Jack Radell, Paul D. Hunt, and William D. Burrows. *U. S. Air Force. Wright Air Development Center. WADC Technical Report* 58-14, Jan. 1958, 16 pp. (TL507 Un3.18w Vis.)

Length and cross-sectional diameter of the molecule are the limiting factors in urea occlusion. The technique offers a convenient way of storing many compounds incorporating the highly reactive Si-H bond, and permits the separation and purification of many alkylsilanes.

8025 Mechanism of the Synthesis of Hydrocarbons From Carbon Monoxide and Hydrogen. Ernst M. Cohn. *U. S. Bureau of Mines Information Circular* 7821, 1958, 13 pp. (TN21 Un3i Vis.)

A review of Soviet research up to 1951.

8026* (Russian.) Tetrasiloxysilanes in Organic Synthesis. **Tetraatsiloksisilany v organicheskom sinteze. XIII.** Synthesis of N,N-Diethylamides and N-Arylamides of Acids From Silicon Anhydrides of Saturated Monobasic Organic Acids. **Sintez N,N-dietilamidov i N-arilamidov kislot s pomoshch'iu**

kremneangidridov predel'nykh odnoosnovykh organicheskikh kislot. Iu. K. Iur'ev and Z. V. Beliakova. *Zhurnal Obshchei Khimii*, v. 28, no. 1, Jan. 1958, p. 3-6.

8027* (Russian.) Radiochemical Investigation of the Reaction of Organometallic Compounds in Benzene Solution. **Radiokhimicheskoe issledovanie reaktsii metalloorganicheskikh soedinenii v benzol'nom rastvore.** I. A. Korshunov and A. A. Orlova. *Zhurnal Obshchei Khimii*, v. 28, no. 1, Jan. 1958, p. 45-47.

Study of diphenyl mercury and diphenyl mercury hydroxide during photolysis and heating. The absence of exchange in the systems diphenyl benzene and tetraphenyl lead benzene was established.

8028* (Russian.) Condensation of ω-Bromoacetophenone With Diethanolamine. **O kondensatsii ω-bromatsetofenona s dietanolaminom.** B. M. Mikhailov and A. N. Makarova. *Zhurnal Obshchei Khimii*, v. 28, no. 1, Jan. 1958, p. 150-153.

Produces cyclic semiacetal-2-phenyl-2-oxy-4-β-oxyethyl morpholine which can be easily etherified by alcohols.

8029* (Russian.) Interaction of Certain Organosilicon Compounds With Cellulose Nitrates. **Vzaimodeistvie nekotorykh kremniiorganicheskikh soedinenii s nitratami tselliulozy.** A. P. Kreshkov, I. Ia. Guretskii, and P. A. Andreev. *Zhurnal Obshchei Khimii*, v. 28, no. 1, Jan. 1958, p. 187-193.

Reaction of colloxylin with tetralkoxysilanes and alkylalkoxysilanes was studied.

See also: **7792** (total synthesis of reserpine).

CHEMISTRY—PHYSICAL

8030* (Russian.) Photochlorination of Ethylchlorosilane in the Liquid State. **Fotokhlorirovanie etiltrikhlorsilana v zhidkom sostoianii.** E. P. Mikheev. *Akademiia Nauk SSSR, Doklady*, v. 117, no. 5, Oct. 11, 1957, p. 821-822.

Photochlorination by means of gaseous Cl in the light of a 150 w. bulb.

8031* (Russian.) The Kinetics and Mechanism of Homogeneous Graphitization of Carbon. **Kinetika i mekhanizm gomogennoi grafitatsii ugleroda.** V. I. Kasatochkin and A. T. Kaverov. *Akademiia Nauk SSSR, Doklady*, v. 117, no. 5, Oct. 11, 1957, p. 837-840.

X-ray analysis of petroleum cokes from 2000 to 2800 C.

8032* (Russian.) Rate of Hydrogenation as Dependent on Amount of Catalyst. **Zavisimost' skorosti gidrirovaniia ot kolichestva skeletnogo nikelevogo katalizatora.** D. V. Sokol'skii and A. B. Fasman. *Akademiia Nauk SSSR, Doklady*, v. 117, no. 5, Oct. 11, 1957, p. 845-847.

Potentiometric study of the processes occurring on the catalyst surface in experiments with 1-hexyne and trans-piperylene.

8033* (Russian.) The Significance of Chain Reactions in the High-Temperature Cracking of Ethane. **O znachenii tsepnykh reaktsii pri vysokotemperaturnom krekinge etana.** A. M. Brodskii, R. A. Kalinenko, K. P. Lavrovskii, and V. B. Titov. *Akademiia Nauk SSSR, Doklady*, v. 117, no. 6, Dec. 21, 1957, p. 1013-1016.

Study of the reaction from 770 to 900 C by algebraic methods.

8034* (Russian.) A Study of the Isotopic Exchange of Oxygen Between Heavy-Oxygen Water and Certain Niobates and Tantalates. **Izuchenie izotopnogo obmena kisloroda mezhdu tiazhelokislorodnoi vodoi i nekotorymi niobatami i tantalatami. V.** I. Spitsyn, et al. *Akademiia Nauk SSSR, Doklady*, v. 118, no. 1, Jan. 1, 1958, p. 107-109.

In sodium pentatantalate, sodium hexatantalate, potassium hexaniobate, and potassium metaniobate, all H atoms of salts and water are available for isotopic exchange with the solvent water.

8035 (Russian.) Kinetics of Peroxide and Hydroperoxide Catalytic Reduction. **Kinetika kataliticheskogo vosstanovleniia perekisei i gidroperekisei. III.** Hydrogenation of Benzoyl Peroxide, Tertiary Butylperbenzoate, and Cyclohexene Hydroperoxide. **Gidrirovanie perekisi benzoila, tretichnobutilperbenzoato i gidroperekisi tsiklogeksena.** A. A. Balandin, L. Kh. Freidlin, and N. V. Nikiforova. *Akademiia Nauk SSSR, Izvestiia, Otdelenie Khimicheskikh Nauk*, 1958, no. 2, Feb., p. 133-144.

8036 (Russian.) Transformations of *m*-Xylene in Presence of Halogenated Salts of Metals in Liquid Phase. **Prevrashcheniia metaksilola v prisustvii galoidnykh solei metallov v zhidkoi faze.** N. I. Shuikin, E. D. Tulupova, and Z. P. Poliakova. *Akademiia Nauk SSSR, Izvestiia, Otdelenie Khimicheskikh Nauk*, 1958, no. 2, Feb., p. 181-185.

Transformations were studied in the presence of halogenated salts of Al and Sn, Ti, Sb, or Zn chlorides, and their equimolecular mixtures with $AlCl_3$.

8037 (Russian.) Investigation of the Stereochemistry of Cyclic Compounds. **Issledovanie v oblasti stereokhimii tsiklicheskikh soedinenii. XIX.** Infrared Spectra of Cyclic Lactones. **Infrakrasnye spektry tsiklicheskikh laktonov.** V. F. Kucherov, I. V. Berezin, and I. N. Nazarov. *Akademiia Nauk SSSR, Izvestiia, Otdelenie Khimicheskikh Nauk*, 1958, no. 2, Feb., p. 186-191.

Infra-red spectra of various cyclic lactones and lactonic acids of the decalin and bicyclo-(1,2,2) heptane series in the range from 1700 to 1800 cm^{-1} were studied.

8038* (Russian.) The Method of Growth of Alkali Halide Phosphates for Scintillation Counters. **Metodika vyrashchivaniia shchelochno-galoidnykh fosforov dlia stsintilliatsionnykh schetchikov.** L. M. Shamovskii, L. M. Rodionova, and A. S. Glushkova. *Akademiia Nauk SSSR, Izvestiia, Seriia Fizicheskaia*, v. 22, no. 1, Jan. 1958, p. 3-11.

Method for growing single crystals; selection, dosage, and distribution of the activator.

8039 (Russian.) Heats of Evaporation of Solutions of Certain Deuterium Compounds. **Issledovanie teplot isparenia rastvorov nekotorykh deiterosoedinenii.** A. Z. Golik, S. D. Ravikovich, and V. E. Baranovskii. *Akademiia Nauk Ukrains'koi RSR, Dopovidi*, 1958, no. 2, p. 210-212.

Study of heavy water solutions in ordinary water and of deuterium-butanol in butyl alcohol.

8040 The Stoichiometry of the Hydration of β-Dicalcium Silicate and Tricalcium Silicate at Room Temperature. Stephen Brunauer, D. L. Kantro, and L. E. Copeland. *American Chemical Society, Journal*, v. 80, Feb. 20, 1958, p. 761-767.

The probable stoichiometry is represented by the equations $2\beta\text{-}Ca_2SiO_4 + 4H_2O = Ca_3Si_2O_7 \cdot 3H_2O + Ca(OH)_2$; $2Ca_3SiO_5 + 6H_2O = Ca_3Si_2O_7 \cdot 3H_2O + 3Ca(OH)_2$.

8041 Nickel, Copper and Some of Their Alloys as Catalysts for the Hydrogenation of Carbon Dioxide. Leland E. Cratty, Jr. and W. Walker Russell. *American Chemical Society, Journal*, v. 80, Feb. 20, 1958, p. 767-773.

Alloying 11% or less of Cu with Ni caused sharp parallel drops in both the magnetic susceptibility and in the power of the catalysts to hydrogenate CO_2 to CH_4 rather than CO. Alloys containing more than 50% Cu behaved essentially like pure Cu in that CO but no CH_4 was produced.

8042 Kinetics of the Exchange Reaction Between Carbon-14-Labeled Carbonate and Carbonato-bis-(Trimethylenediamine)-Cobalt(III) Complex in Aqueous Solution. Effect of Steric Hindrance in a Ligand Substitution Process. James E. Boyle and G. M. Harris. *American Chemical Society, Journal*, v. 80, Feb. 20, 1958, p. 782-786.

8043 The *cis-trans* Isomerization of Dichlorobis-(Ethylenediamine)-Cobalt(III) Chloride and Dichlorobis-(Propylenediamine)-Cobalt(III) Chloride in Alcohols. Robert C. Brasted and Chikara Hirayama. *American Chemical Society, Journal*, v. 80, Feb. 20, 1958, p. 788-794.

Isomerization rates are of first order with respect to the complex, and zero order with respect to added chloride and perchlorate ions. The rates of the reaction in methanol, ethanol and propanol have frequency factors of 10^{12} to 10^{13} $sec.^{-1}$, and small positive entropies of activation.

8044 The Effect of Solvent on the Catalytic Activity of Aliphatic Amines in Elimination Reactions. R. G. Pearson and D. C. Vogelsong. *American Chemical Society, Journal*, v. 80, Mar. 5, 1958, p. 1048-1050.

Triethylamine, di-*n*-butylamine and *n*-hexylamine were used as catalysts to study the rate of elimination of *p*-toluenesulfonic acid from 1-(*p*-toluenesulfonyl)-2-propyl *p*-toluenesulfonate in several non-aqueous solvents. Solvent changes make either the primary, secondary, or tertiary amine the strongest catalytic base.

8045 Microwave Absorption and Molecular Structure in Liquids. XXI. Relaxation Times, Viscosities and Molecular Shapes of Substituted Pyridines, Quinolines and Naphthalenes. Robert W. Rampolla and Charles P. Smyth. **XXII. The Dielectric Relaxation Times of Three Prolate Ellipsoidal Molecules in Benzene Solution.** Donald A. Pitt and Charles P. Smyth. **XXIII. The Dielectric Relaxation Times and Dipole Moments of Several Aryl Isocyanates and Related Compounds.** Brian R. Jolliffe and Charles P. Smyth. *American Chemical Society, Journal*, v. 80, Mar. 5, 1958, p. 1057-1066.

8046 The Measurement of Very Slow Reaction Rates; Decarboxylation of Alanine. Dwight Conway and W. F. Libby. *American Chemical Society, Journal*, v. 80, Mar. 5, 1958, p. 1077-1084.

Method using radioactive labelling and low level counting techniques was applied to decarboxylation of alanine at temperatures corresponding to half-lives from 0.1 to 10^4 yr.

8047 Mechanism of the Nitration of Furans. I. Conversion of the Nitration Intermediate Derived From Furfural Into 5-Nitro-2-furfural Diacetate. Julian G. Michels and Kenyon J. Hayes. *American Chemical Society, Journal*, v. 80, Mar. 5, 1958, p. 1114-1116.

8048 The Reaction of Aromatic Aldehydes With *n*-Butylamine. Acid Catalysis and Substituent Effects. Georges M. Santerre, Charles J. Hansrote, Jr., and Thomas I. Crowell. *American Chemical Society, Journal*, v. 80, Mar. 5, 1958, p. 1254-1257.

General acid catalysis was shown for the reaction of substituted benzaldehydes with *n*-butylamine by employing acetic acid-lithium acetate buffers in methanol. Apparent energies and entropies of activation are given.

8049 Phase Equilibria at High Temperatures in Oxide Systems Involving Changes in Oxidation States. Arnulf Muan. *American Journal of Science*, v. 256, no. 3, Mar. 1958, p. 171-207.

Such phase equilibria determinations require careful control of atmospheric conditions. The desired O_2 partial pressure may be obtained by vacuum techniques, by mixing O_2 with an inert gas, by mixing CO_2 and H_2. Illustrated by the systems Fe-O, FeO-Fe_2O_3-SiO_2, and MgO-FeO-Fe_2O_3-SiO_2.

8050 Potassium Uranyl Vanadate, KUO_2VO_4. Maria J. de Abeledo, Maria R. de Benyacar, and Roberto Poljak. *Analytical Chemistry*, v. 30, Mar. 1958, p. 452-453.

Crystallographic data.

8051 Photooxidation of Ketones in an O^{18} Enriched Environment. J. R. Dunn and K. O. Kutschke. *Canadian Journal of Chemistry*, v. 36, Mar. 1958, p. 421-424.

Shows whether the products of photooxidation arise from the carbonyl or the alkyl groups of the ketone molecule.

8052 A Study of the Conductivity of Certain Acids and Alkali Halides in Glycol and the Influence of the Addition of a Second Solvent. P. Kirby and O. Maass. *Canadian Journal of Chemistry*, v. 36, Mar. 1958, p. 456-464.

The conductivities of HCl, H_2SO_4, HNO_3, and many of their alkali metallic salts were measured in ethylene glycol. Effect of added water, methanol, and H_2O_2 was determined.

8053 Photoconductivity and Absorption and Fluorescence Spectra of 9,10-Dichloroanthracene. E. Bock, J. Ferguson, and W. G. Schneider. *Canadian Journal of Chemistry*, v. 36, Mar. 1958, p. 507-512.

8054 The Change of Photoconduction and Semiconduction in Aromatic Hydrocarbons on Melting. J. Kommandeur, G. J. Korinek, and W. G. Schneider. *Canadian Journal of Chemistry*, v. 36, Mar. 1958, p. 513-517.

Variation of the photocurrent and dark current on melting naphthalene and biphenyl was studied.

8055 The System Lithium Nitrate-Ethanol-Water and Its Component Binary Systems. A. N. Campbell and R. A. Bailey. *Canadian Journal of Chemistry*, v. 36, Mar. 1958, p. 518-536.

Investigated by thermal analysis and by X-ray powder diffraction.

8056 Studies in Co-Ordination Chemistry. XV. Complexes of Chromium With a Di(tertiary Arsine). XVI. Complexes of Bivalent and Tervalent Manganese With a Di(tertiary Arsine). XVII. Complexes of Ruthenium With a Di(tertiary Arsine). XVIII. Complexes of Osmium With a Di(tertiary Arsine). R. S. Nyholm and G. J. Sutton. *Chemical Society, Journal*, 1958, Feb., p. 560-576.

8057 Physical Properties of the Lower Dialkyl Hydrogen Phosphites. F. M. Page and J. H. Purnell. *Chemical Society, Journal*, 1958, Feb., p. 621-623.

Vapor pressures and latent heats of dimethyl, diethyl, di-*n*-propyl, and di-*n*-butyl hydrogen phosphites. Cryoscopic measurements in benzene and camphor.

8058 Solutions in Sulphuric Acid. XXIV. Electrical Conductivity, Cryoscopic, and Density Measurements on Solutions in Dideuterosulphuric Acid. R. H. Flowers, R. J. Gillespie, J. V. Oubridge, and C. Solomons. *Chemical Society, Journal*, 1958, Feb., p. 667-674.

8059 Infrared Absorption of NMe and NMe_2 Groups in Amines. R. D. Hill and G. D. Meakins. *Chemical Society, Journal*, 1958, Feb., p. 760-764.

8060 Entropy Changes in Isomerisations. R. M. Gascoigne. *Chemical Society, Journal*, 1958, Feb., p. 876-881.

Structural and other factors which determine the magnitude of entropy changes in isomerization. Thermodynamic aspects of the cyclization-rearrangement reactions of terpene biosynthesis.

8061 A Nuclear Magnetic Resonance Study of the Hydrates of Molybdenum Trioxide. S. Maričić and J. A. S. Smith. *Chemical Society, Journal*, 1958, Feb., p. 886-891.

Results support the structures $MoO_3 \cdot H_2O$ and $MoO_3 \cdot 2H_2O$, the separation of the H nuclei in the water molecules being 1.56 ± 0.03 Å in both compounds.

8062 The Size, Shape and Mobility of Ionic Zones in Paper Electrophoresis: A Theoretical Analysis. John T. Edward. *Chemistry & Industry*, 1958, no. 10, Mar. 8, p. 276-278.

8063* (French.) Combined Action of Ultrasonics and Ultra-Violet on Water and on Potassium Iodide Solutions. **Action conjuguée des ultrasons et des ultraviolets sur l'eau et les solutions d'iodure de potassium.** Henri Guéguen. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences*, v. 246, no. 8, Feb. 24, 1958, p. 1195-1198.

The M_1/M_2 ratio of the respective quantities of H_2O_2 formed in pure water irradiated by ultrasonics and in pure water subjected to the combined effect of ultrasonics and a complex ultra-violet illumination is close to 0.6 on the presence of 0 and up to 3.8 in the presence of Ar.

8064* (French.) Effect of Temperature on the Nickel Oxide-Molybdic Anhydride Reaction. **Influence de la température sur la réaction oxyde de nickel-anhydride molybdique.** Alain Silvent and Yves Trambouze. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences*, v. 246, no. 9, Mar. 3, 1958, p. 1416-1418.

Dry preparation of molybdates of the transition metals. Nickel oxide was prepared by dehydration at 500 C, under atmospheric pressure, of a hydroxide obtained by the Merlin-Teichner method. Transformation near 450 C by rearrangement in the structure of molybdic oxide.

8065 (English.) **The Adsorption of Sodium Octanoate and Octanoic Acid at the Air/Solution Interface.** E. Matijevic and B. A. Pethica. *Croatica Chemica Acta*, v. 29, nos. 3-4, 1957, p. 431-443.

Surface tension measurements on solutions of octanoic acid in water at 20 C. Variation of surface tension of octanoic acid solutions with pH at 20 C at ionic strength of 0.01. Effect of temperature on surface tension of solutions in 0.1 *N* NaOH and HCl.

8066* (Russian.) A Mass-Spectroscopic Investigation of Electric Discharge Products in Water Vapor. **Mass-spektroskopicheskoe issledovanie produktov razriada v parakh vody.** G. K. Lavrovskaia, V. E. Skurat, V. L. Tal'roze, and G. D. Tantsyrev. *Doklady Akademii Nauk SSSR*, v. 117, no. 4, Dec. 1, 1957, p. 641-644.

Study of atoms and radicals formed in water vapor.

8067* (Russian.) The Stabilizing Effect of Magnesium Upon Ascorbic Acid. **Stabiliziruiushchee deistvie magniia na askorbinovuiu kislotu.** P. S. Romanchuk. *Doklady Akademii Nauk SSSR*, v. 117, no. 4, Dec. 1, 1957, p. 665-667.

It was found that two molecules of ascorbic acid are connected through Mg, and that the most unstable dienol groups are also connected by Mg.

8068 Conductivity and Energy Gap Measurements of Some Relatives of Phthalocyanine. Wolfgang Felmayer and Irving Wolf. *Electrochemical Society, Journal*, v. 105, Mar. 1958, p. 141-145.

Electrical resistance of samples of powdered Cu-phythalocyanine, Pt-phthalocyanine, highly chlorinated Cu-phthalocyanine, and of two polymers of Cu-phthalocyanine were measured at various temperatures in N atmosphere.

8069 The Thermodynamics of Cation Exchange. III. Thermodynamic Properties of Resins Containing a Mixture of Cations. E. H. Cruickshank and P. Meares. *Faraday Society, Transactions*, v. 54, pt. 2, Feb. 1958, p. 174-185.

8070 The Reaction Between Alcohols and Acid Chlorides in Solvents of Low Polarity. R. F. Hudson and I. Stelzer. *Faraday Society, Transactions*, v. 54, pt. 2, Feb. 1958, p. 213-221.

The rates of reaction of acetyl chloride with several alcohols in non-polar solvents are found to be proportional to the concentrations of associated alcohol as determined spectroscopically.

8071 Some Aspects of Detonation. I. Detonation Velocity and Chemical Constitution. II. Detonation Velocity as a Function of Oxygen Balance and Heat of Formation. A. R. Martin and H. J. Yallop. *Faraday Society, Transactions*, v. 54, pt. 2, Feb. 1958, p. 257-267.

Detonation velocity was correlated with the structural features of the unreacted molecule; from this a rapid method of estimating the detonation velocity of organic high explosives was developed.

8072 Generalized Equation of State for Gases and Liquids. J. O. Hirschfelder, R. J. Buehler, H. A. McGee, Jr., and J. R. Sutton. *Industrial and Engineering Chemistry*, v. 50, Mar. 1958, p. 375-385.

8073 Generalized Thermodynamic Excess Functions for Gases and Liquids. J. O. Hirschfelder, R. J. Buehler, H. A. McGee, Jr., and J. R. Sutton. *Industrial and Engineering Chemistry*, v. 50, Mar. 1958, p. 386-390.

Concise formulas for the thermodynamic excess functions of gases and liquids are presented in a form suitable for high-speed digital machine computations.

8074 Vapor Phase Imperfections in Vapor-Liquid Equilibria. Semiempirical Equation. Cline Black. *Industrial and Engineering Chemistry*, v. 50, Mar. 1958, p. 391-402.

Equation is explicit in volume and can be applied to nonpolar substances with the aid of critical temperature, critical pressure, and vapor pressure. For polar substances one or two individual coefficients in addition to these are necessary.

8075* (Russian.) Redox Systems for Initiating Radical Processes. **Okislitelno-vosstanovitelyne sistemy dlia initsiirovaniia radikalnykh protsessov. VIII.** On the Mechanism of the Effect of Systems Containing Ethylenediamine and Hydroperoxides. **O Mekhanizme deistviia sistemy, soderzhashchei etilendiamine i gidroperekisi.** G. P. Belonovskaia, B. A. Dolgoplosk, Zh. D. Vasiutina, and M. N. Kulakova. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk*, 1958, no. 1, Jan., p. 24-34.

Interaction kinetics of ethylenediamine with isopropylbenzene hydroperoxide in aqueous and aqueous-organic media in the presence of various amounts of Fe salts. No direct connection between kinetics of the decomposition of hydroperoxide and that of polymerization was established.

8076 Adsorption at Inorganic Surfaces. II. Adsorption of Dyes and Related Compounds by Silica. Margaret M. Allingham, et al. *Journal of Applied Chemistry*, v. 8, pt. 2, Feb. 1958, p. 108-116.

8077 (French.) Kinetic Theory of Self Diffusion in Liquids. **Theorie cinetique de la self-diffusion dans les liquides.** B. Ottar. *Journal de Chimie Physique*, v. 54, nos. 11-12, Nov.-Dec. 1957, p. 865-861.

The coefficient of self diffusion of infinite dilution ions was expressed by means of the diffusing group concept. Relationship between self-diffusion and viscosity expressed the self-diffusion coefficient of large molecules in solution.

8078 (French.) Nature of the Transition State of Flow and Diffusion Phenomena. **La nature de l'état de transition dans les phénomènes d'écoulement et de diffusion.** F. Kohler. *Journal de Chimie Physique*, v. 54, nos. 11-12, Nov.-Dec. 1957, p. 902-905.

8079 (French.) Free Diffusion Near the Critical Miscibility Temperature. **Diffusion libre au voisinage de la température critique de miscibilite.** Stig Claesson and Lars-Olof Sundelof. *Journal de Chimie Physique*, v. 54, nos. 11-12, Nov.-Dec. 1957, p. 914-919.

Variations of the free diffusion coefficient as a function of temperature were determined near the critical point, as were the viscosity and density.

8080 The Flocculation of Sodium Montmorillonite by Electrolytes. Allan Kahn. *Journal of Colloid Science*, v. 13, no. 1, Feb. 1958, p. 51-60.

Flocculation by NaCl, $CaCl_2$, $AlCl_3$, and $La(NO_3)_3$ was studied by means of viscometry and optical transmission.

8081 Micellar Dispersion of α-Monoglycerides in Benzene and Chlorobenzene. P. Debye and W. Prins. *Journal of Colloid Science*, v. 13, no. 1, Feb. 1958, p. 86-98.

8082 Electronegativities of Carbon, Silicon, Germanium, Tin and Lead. A. L. Allred and E. G. Rochow. *Journal of Inorganic and Nuclear Chemistry*, v. 5, no. 4, 1958, p. 269-288.

8083 The Extraction of Uranium(VI) From Acid Perchlorate Solutions by Di-(2-Ethylhexyl)-Phosphoric Acid in *n*-Hexane. C. F. Baes, Jr., Ralph A. Zingaro, and C. F. Coleman. *Journal of Physical Chemistry*, v. 62, Feb. 1958, p. 129-136.

The distribution of U(VI) between acidic aqueous perchlorate solutions and solution of di-(2-ethylhexyl)-phosphoric acid in *n*-hexane was examined as a function of extraction variables at constant aqueous ionic strength.

8084 Heats of Formation of Some Solid Solutions of Alkali Halides. M. W. Lister and N. F. Meyers. *Journal of Physical Chemistry*, v. 62, Feb. 1958, p. 145-150.

Systems examined were: NaBr:KBr, NaI:KI, NaBr:NaI, KBr:KI, NaCl:KCl, and NaCl:NaBr.

8085 Dielectric Constants and Viscosities of Several N-Substituted Amides as Functions of Their Structure and of Temperature. Joe W. Vaughn and Paul G. Sears. *Journal of Physical Chemistry*, v. 62, Feb. 1958, p. 183-188.

The dielectric constants of nine N-alkylamides of carboxylic acids and the N-methyl- and N,N-dimethylamides of methanesulfonic and benzenesulfonic acids were measured from 25 to 55 C except where the amide is a solid.

8086 The Crystal Structure of Copper Manganite. A. P. B. Sinha, N. R. Sanjana, and A. B. Biswas. *Journal of Physical Chemistry*, v. 62, Feb. 1958, p. 191-194.

8087 Heats of Formation of Liquid Alloys at 1100° by a Simple Reaction Calorimeter. R. A. Oriani and W. K. Murphy. *Journal of Physical Chemistry*, v. 62, Feb. 1958, p. 199-202.

Design and operation of a simple, high-temperature reaction calorimeter capable of ± 10% accuracy. Enthalpies of formation at 1100 C of liquid Ag-Au, Ag-Cu, and Au-Ni alloys from their liquid components.

8088 Solid-Liquid Equilibrium in the Lithium-Lithium Hydride System. Charles E. Messer, et al. *Journal of Physical Chemistry*, v. 62, Feb. 1958, p. 220-222.

The freezing points were determined by thermal analysis. The freezing point as a function of composition resembled that of metal-metal halide systems.

8089* (French.) Comparative Study of the Pleomorphic Transformations of Crystals of Silver Iodomercurate and Copper Iodomercurate. **Étude comparée des transformations polymorphiques des cristaux d'iodomercurate d'argent et d'iodomercurate cuivreux.** Jean Jaffray. *Journal des Recherches du Centre National de la Recherche Scientifique*, no. 39, June 1957, p. 125-130.

Dilatometry and diffusion spectra of powders prove that the transformation of silver iodomercurate is discontinuous.

8090* Heat Content of Sodium Borohydride and of Potassium Borohydride From 0° to 400°C. Thomas B. Douglas and Ann W. Harman. *Journal of Research, National Bureau of Standards*, v. 60, Feb. 1958, p. 117-124.

8091* Infrared Spectra of Crystalline Polyphenyls. James E. Stewart and Max Hellmann. *Journal of Research, National Bureau of Standards*, v. 60, Feb. 1958, p. 125-136.

8092 Polytherm of the Quaternary System Sodium Chloride-Sodium Sulphate-Sodium Carbonate-Water. K. Seshadri and J. Lobo. *Journal of Scientific & Industrial Research*, v. 16, sec. B, Dec. 1957, p. 531-538.

Studies at 10, 5, 0, and −5 C indicate that all the components can be separated by chilling and fractional crystallization.

8093* (Russian.) The Solubility of Gases in Petroleum at Elevated Temperature and Pressure. **Izuchenie rastvorimosti gazov v neftiakh pri povyshennykh davleniakh i temperaturakh.** T. P. Safronova and T. P. Zhuze. *Khimiia i Tekhnologiia Topliv i Masel*, 1958, no. 2, Feb., p. 41-46.

Solubility increases with pressure and decreases with temperature. Methane had the highest solubility and N the lowest.

8094* (German.) Gels as Salts From Polyelectrolytes. **Über Gele als Salze von Polyelektrolyten.** Heinrich Thiele and Hans Affeldt. *Kolloid Zeitschrift*, v. 156, no. 1, Jan. 1958, p. 14-21.

Formation of metal-alginate gels. Measuring ion specificity by changing the equilibrium of the electrolytic solution. Expansive capacity and $Me(NO_3)_2$ concentration. Solubility of Co- and Ni-alginic acids.

8095* (Russian.) Vapor Pressure Within the Ternary Systems $MeCl_2$-HCl-H_2O. The $BaCl_2$-HCl-H_2O System. **Davlenie para v troinykh sistemakh $MeCl_2$-HCl-H_2O. Sistema $BaCl_2$-HCl-H_2O.** L. S. Lilich and V. I. Timofeev. *Leningrad. Universitet. Vestnik*, v. 12, no. 22, 1957, p. 127-130.

Measured at 25, 30, 35, and 45 C.

8096* Mass Transfer in Liquid Metal Systems. II. Isothermal Transfer. J. W. Taylor and A. G. Ward. *Nuclear Power*, v. 3, no. 23, Mar. 1958, p. 101-105.

8097* (English.) **X-Ray Studies on the Structures of Solid Solutions NaCl-$CaCl_2$. III. Influence of Heat Treatments on the Diffuse Reflexions of X-Rays Due to { 111 } and { 310 } Plate-Zones.** Kazuo Suzuki. *Physical Society of Japan, Journal*, v. 13, no. 2, Feb. 1958, p. 179-186.

8098* The Electrical Conductivity of Chlorinated Hydrocarbons. John Hart and A. G. Mungall. *Power Apparatus and Systems*, 1958, no. 34, Feb., p. 1295-1301.

Experiments on chloroform and chlorobenzene of unusual purity show that the d.c. conductance of liquid semi-insulators depends upon the impurities present (including air) and upon the material of the cell electrodes. Effects at the electrodes are split into ohmic, concentration, and activation polarizations.

8099 On the Lattice Vibrations of Benzene, Naphthalene, and Anthracene. D. W. J. Cruickshank. *Reviews of Modern Physics*, v. 30, no. 1, Jan. 1958, p. 163-167.

8100* (Spanish.) Magnetic Nuclear Resonance Spectroscopy. Special Reference to Its Use in Organic Chemistry. **Espectroscopia de resonancia nuclear magnética. Especial referencia a su utilización en química orgánica.** José Castells. *Revista de Ciencia Aplicada*, v. 11, no. 6, Nov.-Dec. 1957, p. 499-513.

Relationship between spectroscopy and magnetism. Determining the frequencies of resonance. Presence of fine structure in the spectra. Field created by other nuclear dipoles. Magnetic sensitivity of samples. Quadrupolar moments. Magnetic resonance in ethanol. Hammett's sigma constants.

8101 The Measurement of Very Low Vapour Pressures Using Radioactive Isotopes: The Latent Heat of Sublimation of Mercury Diphenyl. A. S. Carson, D. R. Stranks, and B. R. Wilmshurst. *Royal Society, Proceedings*, v. 244, ser. A, Feb. 25, 1958, p. 72-84.

A modified Knudsen effusion system, suitable for studying the vapor pressures of radioactive compounds is described.

8102 Temperature Dependence of Vibrational Relaxation Times in Gases. P. G. Corran, J. D. Lambert, R. Salter, and B. Warburton. *Royal Society, Proceedings*, v. 244, ser. A, Mar. 11, 1958, p. 212-219.

Ultrasonic dispersion measurements from 290 to 580 K were made on gaseous ethylene, *cyclo*propane, CF_4, CH_3Cl, and CH_3Br.

8103 Primary Photoprocesses in Quinones and Dyes. I. Spectroscopic Detection of Intermediates. II. Kinetic Studies. N. K. Bridge and G. Porter. *Royal Society, Proceedings*, v. 244, ser. A, Mar. 11, 1958, p. 259-288 + 4 plates.

8104* (French.) Application of Infra-Red Absorption Spectrography to the Study of Ozonation and Autoxidation. **Application de la spectrographie d'absorption infrarouge à l'étude de l'ozonation et de l'autoxydation.** E. Briner. *Société Chimique de France*, 1958, no. 1, Jan., p. 69-75.

Study of the ozonation of trans-stilbene; accelerated autoxidation caused by ozone; spontaneous separation of the ozonides. Application to the ozonation of different olefins and of some terpenes.

8105* (German.) Reciprocal Effect of the Emission of Sodium and Potassium During Flame-Photometric Determination. **Über die gegenseitige Beeinflussung der Emission von Natrium und Kalium bei ihrer flammenphotometrischen Bestimmung.** K. E. Stumpf and Th. Gonsior. Paper from Proceedings of the Colloquium Spectroscopicum Internationale VI. Amsterdam. May, 1956. *Spectrochimica Acta* (Supplement), 1957, p. 35-43.

Measuring the emission from 0 to 10 mg. Na/liter with addition of up to 10 mg. K/liter. Measurements in neutral solutions of pure Na- and K-salts. Reciprocal effect in the presence of Al. Effect of Fe on the emission.

8106* (French.) Flame Photometric Determination of Sodium in Aluminum Oxide. **Détermination du sodium par spectrophotométrie de flamme dans l'oxyde d'aluminium.** L. Braicovich and M. F. Landi. Paper from Proceedings of the Colloquium Spectroscopicum Internationale VI. Amsterdam. May, 1956. *Spectrochimica Acta* (Supplement), 1957, p. 51-61.

Complete attack of Na by a mixture of Li_2CO_3 and B_2O_3 (x-y) at 1200 C and dissolution in HCl. The resulting solution contained chlorides and borates of Li, Al, Ca, Fe, and Na with small amounts of Ti and Si.

8107* (Swedish.) Production and Properties of Free Radicals. Fria radikalers framställning och egenskaper. Sven Sönnerskog. *Svensk Kemisk Tidskrift*, v. 70, no. 1, 1958, p. 15-29.

Formation and detection; typical reactions. Reversible and irreversible electrode processes. Thermal dissociation and excitation. Direct oxidation of hydrazine derivatives.

8108* (Russian.) Investigation of a Ternary System NaCl-KCl-$TiCl_3$. **Issledovanie troinoi sistemy NaCl-KCl-$TiCl_3$.** M. V. Kamenetskii. *Tsvetnye Metally*, v. 31, no. 2, Feb. 1958, p. 39-45.

Two binary systems investigated were NaCl-$TiCl_3$ and KCl-$TiCl_3$. Their melting points and composition are shown. In the ternary system NaCl-KCl-$TiCl_3$, the lowest melting point of 590 C is a composition (in mol. %) of: 40 NaCl, 48 KCl, and 12 $TiCl_3$. The existence of the compound K_2TiCl_6 was proven and Na_2TiCl_6 was indicated.

8109* (Russian.) Determining the Cooling Ability of Fused Salts. **Opredelenie okhlazhdaiushchei sposobnosti rasplavlennykh solei.** D. Ia. Vishniakov and A. A. Neustruev. *Zavodskaia Laboratoriia*, v. 24, no. 1, 1958, p. 63-65.

The following chemically pure salts were studied: $NaNO_2$ (m.p. 308 C), $NaNO_3$ (m.p. 271 C), and a mixture of 45% $NaNO_3$ and 55% KNO_3, (m.p. 218 C). Experiments were performed from 270 to 570 C.

8110* (German.) The Kinetics of Crystallization in Macromolecular Substances. **Über die Kristallisationskinetik in makromolekularen Substanzen.** Bernd Kahle. *Zeitschrift für Elektrochemie*, v. 61, no. 10, 1957, p. 1318-1328.

Dilatometric study of the total crystallization of Rilsan (11-Nylon) at different temperatures above that of the maximum crystallization rate with a change of volume. Microscopical measurements of the growth rate of spherulite. Avrami's theory of crystallization kinetics.

8111* (German.) Temperature-Dependence of the Isotope Effect During Electrolytic Migration of Chlorine Ions in Molten Thallium(I) Chloride. **Die Temperaturabhängigkeit des Isotopie Effektes bei der elektrolytischen Wanderung der Chlorionen in geschmolzenem Thallium(I)-chlorid.** W. Herzog and A. Klemm. *Zeitschrift für Naturforschung*, v. 13a, no. 1, Jan. 1958, p. 7-16.

The mass effect μ (relative difference of migration velocities/relative difference of masses) for the electrolytic migration of Cl ions in melted TlCl was measured.

8112* (German.) Mass-Spectrometric Studies of Hydrocarbons at High Temperatures. **Massenspektrometrische Untersuchungen von Kohlenwasserstoffen bei hohen Temperaturen.** H. Ehrhardt and O. Osberghaus. *Zeitschrift für Naturforschung*, v. 13a, no. 1, Jan. 1958, p. 16-21.

Mass spectra for saturated hydrocarbons with 5, 6, and 7 C-atoms were studied from 100 to 900 C.

8113* (German.) The Infra-Red Spectrum of Dimethyl Boric Acid. **Das Infrarot-Spektrum der Dimethylborsäure.** D. Ulmschneider and J. Goubeau. *Zeitschrift für Physikalische Chemie (Frankfurt)*, v. 14, nos. 1-2, Jan. 1958, p. 56-60.

Infra-red spectra of gaseous dimethyl boric acid and monodeuterodimethyl boric acid in the range of 300 to 4000 cm^{-1} and coordination of the molecular vibrations. Strength of the B-O bond.

8114* (German.) Vibration Spectrum of $BF_3 \cdot NH_3$. **Das Schwingungsspektrum von $BF_3 \cdot NH_3$.** J. Goubeau and H. Mitschelen. *Zeitschrift für Physikalische Chemie (Frankfurt)*, v. 14, nos. 1-2, Jan. 1958, p. 61-64.

Infra-red spectrum between 300 and 4000 cm^{-1} of solid $BF_3 \cdot NH_3$. Raman spectra of solid substance and aqueous solution.

8115* (German.) Method for the Continuous Observation of Diffusion Phenomena in Solids. **Über ein Messverfahren zur kontinuierlichen Beobachtung von Diffusionsvorgängen in festen Körpern.** W. Karger. *Zeitschrift für Physikalische Chemie (Frankfurt)*, v. 14, nos. 1-2, Jan. 1958, p. 88-105.

Experimental and theoretical bases of a measuring process that permits following of the diffusion phenomena with coefficients from 10^{-4} to 10^{-5} [cm^2/sec]. The principle is based on the displacement of the center of gravity effected by the compensation process.

8116* (English.) **Mechanism of Chromic Acid Oxidations. VII. Oxidation of Ethylene Glycol: by Chromic Acid.** A. C. Chatterji and S. K. Mukherjee. *Zeitschrift für Physikalische Chemie (Leipzig)*, v. 207, nos. 5-6, Oct. 1957, p. 372-382.

The order of the reaction with respect to ethylene glycol, H^+ion, and chromic acid, and the temperature coefficients for various temperatures ranging between 25 and 55 C were determined at different concentrations.

8117* (Russian.) The Adsorption of Methanol Vapors on the Hydrated Surface of Silica Gels and Quartz. **Adsorbtsiia parov metanola na gidratirovannoi poverkhnosti silikagelei i kvartse.** L. N. Soboleva and A. V. Kiselev. *Zhurnal Fizicheskoi Khimii*, v. 32, no. 1, Jan. 1958, p. 49-57.

The absolute isotherm of primary adsorption was determined. The mechanism of methanol vapor adsorption is quite similar to that of adsorption of water vapor and is chiefly due to a H bonding with the silicic acid hydroxyls.

8118* (Russian.) Electron Diffraction Studies of Molecular Structure. **Elektronograficheskoe issledovanie stroeniia molekul. VIII.** Barium Halides. **Galogenidy bariia.** P. A. Akishin, V. P. Spiridonov, G. A. Sobolev, and V. A. Naumov. *Zhurnal Fizicheskoi Khimii*, v. 32, no. 1, Jan. 1958, p. 58-61.

Experimental data on the structure of these salts were obtained from a study of the diffraction of fast electrons in a stream of the vapor. A linear structure was established for these molecules and the interatomic distances were found.

8119* (Russian.) The Electrocapillary Behavior of Unsaturated Alicyclic and Aliphatic Hydrocarbons. **Elektrokapiliarnoe povedenie nepredelnykh alitsiklicheskikh i alifaticheskikh uglevodorodov.** M. A. Gerovich and G. F. Rybalchenko. *Zhurnal Fizicheskoi Khimii*, v. 32, no. 1, Jan. 1958, p. 109-115.

Five- and six-membered unsaturated cyclic and unsaturated aliphatic compounds were studied. Both types of hydrocarbons in which some of the C-C bonds are effected by π-electrons are shown to be adsorbed on a positively charged Hg surface.

8120* (Russian.) On the Kinetics of the Interaction Between Gases and Metallic Surfaces. **K voprosu o kinetike vzaimodeistviia gazov s poverkhnost'iu metallov.** V. A. Arslambekov. *Zhurnal Fizicheskoi Khimii*, v. 32, no. 1, Jan. 1958, p. 170-177.

8120a* (Russian.) The Semiconductor Properties of Phthalocyanines. **Poluprovodnikovye svoistva ftalotsianinov. I.** The Electro- and Photoconductivities of Phthalocyanines in Vacuum and in Oxygen. **Elektroprovodnost i fotoprovodimost ftalotsianinov v vakuume i v kislorode.** A. T. Vartanian and I. A. Karpovich. *Zhurnal Fizicheskoi Khimii*, v. 32, no. 1, Jan. 1958, p. 178-187.

Layers of nonmetallic and Cu and Zn phthalocyanines prepared and carefully degassed under vacuum conditions possess a primary conductivity.

8121* (Russian.) The State of Microquantities of Radioelements in Liquid and Solid Phases. **Sostoianie mikrokolichestv radioelementov v zhidkoi i tverdoi fazakh.** I. E. Starik. *Zhurnal Neorganicheskoi Khimii*, v. 3, no. 1, Jan. 1958, p. 6-15.

Survey of adsorption and translocation of radioelements in various types of dispersions and solutions.

8122* (Russian.) The Distribution of Microcomponents Between Fusion and the Crystal Phase. **Raspredelenie mikrokomponenta mezhdu rasplavom i kristallicheskoi fazoi.** V. R. Klokman. *Zhurnal Neorganicheskoi Khimii*, v. 3, no. 1, Jan. 1958, p. 33-35.

A study of three component systems of alkali and alkaline earth salts. The coefficients of crystallization of Ra salts decrease when the halogenide of an alkali metal within the systems containing $BaCl_2$ and $PbCl_2$ is substituted by $CdCl_2$ and $ZnCl_2$. At 410 C and below, $RaCl_2$ did not crystallize with $PbCl_2$.

8123* (Russian.) The Ion-Exchange Sorption of Radioelements. **Ionoobmennaia sorbtsiia radioelementov.** B. P. Nikol'skii. *Zhurnal Neorganicheskoi Khimii*, v. 3, no. 1, Jan. 1958, p. 59-65.

Ion exchange can be used to study radio-colloids and to determine the coefficients of activity of the electrolytes in aqueous solutions.

8124* (Russian.) The Ion-Exchange Chromatographic Separation of the Radioisotopes of Rare-Earth Elements. **Ionoobmennoe khromatograficheskoe razdelenie radioizotopov redkozemel'nykh elementov.** A. K. Lavrukhina, et al. *Zhurnal Neorganicheskoi Khimii*, v. 3, no. 1, Jan. 1958, p. 82-87.

The effect of the amount of elements on the degree of their separation, and on the position and form of peak on the chromatographic curves.

8125* (Russian.) The Adsorption of Microquantities of Uranium by Iron Hydroxide and Its Desorption by Carbonate Method. **Adsorbtsiia mikrokolichestv urana gidrookis'iu zheleza i desorbtsiia ego karbonatnym metodom.** I. E. Starik, F. E. Starik, and A. N. Apollonova. *Zhurnal Neorganicheskoi Khimii*, v. 3, no. 1, Jan. 1958, p. 121-128.

8126* (Russian.) Extraction as a Method of Separating and Studying Radioactive Elements. **Ekstraktsiia kak metod vydeleniia i izucheniia radioaktivnykh elementov.** V. M. Vdovenko. *Zhurnal Neorganicheskoi Khimii*, v. 3, no. 1, Jan. 1958, p. 145-154.

Study of extraction methods based on distribution of elements in two immiscible liquids.

8127* (Russian.) Chemical Studies of Uranium Oxalate and Thorium Oxalate. **Issledovaniia po khimii oksalatov urana i toriia.** A. A. Grinberg, G. I. Petrzhak, and L. I. Evteev. *Zhurnal Neorganicheskoĭ Khimii*, v. 3, no. 1, Jan. 1958, p. 204-211.

Determines the coordination structure of the salt $K_4[U(C_2O_4)_4 \cdot 5H_2O$, and its stability in aqueous solution. Compares the physical-chemical properties (electrical conductivity, pH, and solubility) of the $6H_2O$ oxalates of tetravalent U and Th.

8128* (Russian.) The Extraction of Perchloric Acid and Uranyl Perchlorate by Tributylphosphate. **Ekstraktsiia khlornoi kisloty i perkhlorata uranila tributilfosfatom.** V. B. Shevchenko, I. V. Shilin, and A. S. Solovkin. *Zhurnal Neorganicheskoĭ Khimii*, v. 3, no. 1, Jan. 1958, p. 225-230.

Analyzes the distribution of uranyl perchlorate and perchloric acid between water and tributyl phosphate. The diffusion of uranyl perchlorate and perchloric acid is determined by the ionization of the aqueous phase, by the concentration of tributyl phosphate, by the nature of diluent, and by the properties of the alkali metals.

8129* (Russian.) The Sorption of Radioactive Isotopes by Aluminum Hydroxide. **Sorbtsiia radioaktivnykh izotopov gidrookis'iu aliuminiia.** S. A. Voznesenskii, V. V. Pushkarev, and V. F. Bagretsov. *Zhurnal Neorganicheskoĭ Khimii*, v. 3, no. 1, Jan. 1958, p. 235-239.

The sorption of microconcentrations of Cs^{137}, Sr^{89}, Sr^{90}, Ru^{106}, and Ce^{144} was studied.

8130* (Russian.) The Stability of Citrate Complexes of Some Metals. **Ustoichivost' limonnokislykh kompleksov nekotorykh metallov.** P. K. Migal' and A. Ia. Sychev. *Zhurnal Neorganicheskoĭ Khimii*, v. 3, no. 2, Feb. 1958, p. 314-324.

The stability of the complexes formed by ions of bivalent metals with citric acid decreases in the order: Cu > Ni > Co > Zn > Cd. Stability constants were determined on the basis of potentiometric titration.

8131* (Russian.) Study of the Phase Composition, Structure, and Homogeneity Limits of the Phases in the System V-C-O. **Issledovanie fazovogo sostava, stroeniia, i granits gomogennosti faz sistemy Vanadii-Uglerod-Kislorod. III.** X-Ray Investigation of the System V-C-O. **Rentgenograficheskoe issledovanie v sisteme V-C-O.** M. A. Gurevich and B. F. Ormont. *Zhurnal Neorganicheskoĭ Khimii*, v. 3, no. 2, Feb. 1958, p. 403-412 + 2 plates.

8132* (Russian.) Study of the Interaction of Ammonia With Zinc Salts in Aqueous Medium. **Izuchenie vzaimodeistviia mezhdu ammiakom i soliami tsinka v vodnoi srede. I.** The Solubility of Zinc Chloride in Ammonia-Water Solutions. **Rastvorimost' khloristogo tsinka v vodnoammiachnykh rastvorakh. II.** The Solubility of Zinc Bromide in Ammonia-Water Solutions. **Rastvorimost' bromistogo tsinka v vodnoammiachnykh rastvorakh. III.** The Solubility of Zinc Iodide in Ammonia-Water Solutions. **Rastvorimost' iodistogo tsinka v vodnoammiachnykh rastvorakh. IV.** The Solubility of Zinc Nitrate in Ammonia-Water Solutions. **Rastvorimost' azotnokislogo tsinka v vodnoammiachnykh rastvorakh.** G. G. Urazov, A. K. Kirakosian, and R. S. Mkhitarian. *Zhurnal Neorganicheskoĭ Khimii*, v. 3, no. 2, Feb. 1958, p. 464-497.

8133* (Russian.) Combined Solubility of Uranyl Nitrate, and Nitrates of the Alkaline-Earth Metals in Water. **Izuchenie sovmestnoi rastvorimosti nitrata uranila i nitratov shchelvchnozemel'nykh metallov v vode. I.** M. A. Iakimov, N. F. Nosova, and V. A. Grishin. *Zhurnal Neorganicheskoĭ Khimii*, v. 3, no. 2, Feb. 1958, p. 504-507.

Solubility of the following systems was studied: $UO_2(NO_3)_2$-$Ba(NO_3)_2$-H_2O at 0, 25, and 50 C; $UO_2(NO_3)_2$-$Sr(NO_3)_2$-H_2O at 25 C; $UO_2(NO_3)_2$-$Ca(NO_3)_2$-H_2O at 0 and 25 C.

8134* (Russian.) Study of Conjugated Systems. **Issledovaniia v oblasti sopriazhennykh sistem. LXXXII.** Infra-Red Spectra of Vinylacetylene and Diene Ethers. **Infrakrasnye spektry vinilatsetilenovykh i dienovykh efirov.** A. A. Petrov and G. I. Semenov. *Zhurnal Obshchei Khimii*, v. 28, no. 1, Jan. 1958, p. 71-75.

Infra-red spectra of seven vinylacetylene ethers were studied.

8135* (Russian.) Hydrogenation in the Presence of Colloidal Palladium. **Gidrirovanie v prisutstvii kolloidal'nogo palladiia. IX.** Hydrogenation of Vinylpropyl- and Vinylbutyl Acetylenes. **Gidrirovanie vinilpropil-i vinilbutilatsetilenov.** Kh. V. Bal'ian, Z. A. Lerman, and L. A. Merkur'eva. *Zhurnal Obshchei Khimii*, v. 28, no. 1, Jan. 1958, p. 110-116.

The H addition occurs at the triple bond, and further hydrogenation changes the formed 1,3-dienes into corresponding ethylene hydrocarbons. 1,3-Octadiene, 1,2,3,4-tetrabromoheptane, and tetrabromooctane were characterized.

8136* (Russian.) Chemical Bond in Semiconducting Cobalt Triantimonide. **Khimicheskaia sviaz' v poluprovodnikovom triantimonide kobal'ta.** L. D. Dudkin. *Zhurnal Tekhnicheskoĭ Fiziki*, v. 28, no. 2, Feb. 1958, p. 240-244.

Study of $CoSb_3$ formed according to the constitutional diagram at 859 C.

See also: **7902** (polarography in non-aqueous solutions); **8226** (electrolytic conductivity determination); **8230** (electrometric measurements of reactions); **8392** (dispersion of detergent additives in petroleum); **8529** (equilibrium in Pb-Sb-O and Pb-As-O systems); **8744** (sorption of cations by Ge).

COATINGS

8137 Oxidation of Iron Pretreated for Porcelain Enameling. L. E. Fussell and R. L. Hadley. *American Ceramic Society, Journal*, v. 41, Mar. 1, 1958, p. 81-88.

The thickness of oxide layers formed on enameling iron at short times was measured as a function of temperature to compare the effects of three pretreatments: H_2SO_4 pickle, Ni flash, and phosphate coating. The oxides present were examined by X-ray diffraction and metallographic techniques.

8138 Metalizing of Flat Surfaces. I-II. *American Machinist*, v. 102, Mar. 10, 1958, p. 143 + 1 page.

Procedure recommended by the American Welding Society.

8139* Automatic Spray Painting of Electrical Conduit. Eric H. Cocks. *Automation*, v. 5, Mar. 1958, p. 69-72.

Study of considerations and equipment pertaining to coating of conduit interior surfaces.

8140 What's New in Refractory Ceramic Coatings for Super Metal Alloys. *Ceramic Industry*, v. 70, Mar. 1958, p. 62-64.

The newly developed types of ceramic coatings consist of three phases. One represents a standard high temperature resistant refractory coating, two consists in introducing boron nitride, and three introduces a fluxing agent, preferably a Li compound.

8141* (French.) Phosphating With Iron Phosphate. **La phosphatation par le phosphate de fer.** M. J. Demesse. *Corrosion et Anticorrosion*, v. 6, no. 2, Feb. 1958, p. 37-39.

Preparation of the sulfate solution by the Waltérization process. Simplicity and efficiency of a method for which iron phosphate alone is used.

8142* (French.) Variations of the Density of Phosphate Layers on Iron and Their Protective Value According to the Time Spent in Producing Them. **Variations de la densité des couches phosphatiques sur le fer et de leur valeur protectrice suivant le temps employé à les produire.** Emilio Jimeno and Antonio Arévalo. *Corrosion et Anticorrosion*, v. 6 no. 2, Feb. 1958, p. 51-58.

The thickness of the trizinc phosphate layers formed on Fe does not depend upon the phosphating treatment time. Partial rearranging phenomena and changes of the grain size in the phosphate layer effect the protective life.

8143* (German.) Recent Data on the Hardening of Polyester Varnish Films. **Neuere Erkenntnisse auf dem Gebiet der Härtung von Polyester-Lackfilmen.** P. Maltha and L. W. J. Damen. *Fette, Seifen, Anstrichmittel*, v. 59, no. 12, Dec. 1957, p. 1071-1078.

Study of a method for determining hardening based on "pencil hardness" and the solvent stability. Differences in the behavior of peroxides, accelerators, and their combinations.

8144 Survey of Abrasion-Resistance Tests for Vitreous Enamels. J. A. Clarke. *Foundry Trade Journal*, v. 104, Feb. 13, 1958, p. 179-183.

A survey of methods examined in an attempt to establish a standard abrasive- or scratch-resistance test.

8145 Masking for Painting. P. C. Bardin. *Industrial Finishing*, v. 34, no. 5, Mar. 1958, p. 8 + 8 pages.

Includes the use of pressure-sensitive masking tape, pre-cut self-sticking masks, plugs, caps, close-fitting metal masks for intricate-contour surfaces, strippable coatings, and spray mask machines in which controlled guns spray color through masks.

8146* High Temperature Coatings. Alfred F. Hofstatter. *Industrial Finishing (London)*, v. 10, Feb. 1958, p. 34-36.

Surveys developments in protective finishes for high temperature materials used in aircraft and missiles.

8147 Phosphoric Acid Treatments for Steel. I. The Nature of Coatings Produced by the Action of Phosphoric Acid on Steel. M. Donovan, J. W. Scott, and L. L. Shreir. *Journal of Applied Chemistry*, v. 8, nt. 2, Feb. 1958, p. 87-96.

Variation of coating composition with time of exposure to atmospheric O. Role of O in the reaction mechanism.

8148* (Russian.) Arc Deposition of Electrodes in a Stream of Nitrogen. **Dugovaia naplavka elektrodov v strue azota.** V. P. Smirnov. *Mashinostroitel'*, 1958, no. 1, Jan., p. 24-25.

Hard surfacing using N at 150 to 200 mm. water pressure.

8149 How Grit Blasting Improves Phosphate Coatings. Jacob Knanishu. *Metal Finishing*, v. 56, Mar. 1958, p. 58-62.

An evaluation of the room temperature phosphating process. Comparative coating weight tests.

8150* (German.) Effect of the Surface of Metallic Materials on the Performance of Structural Parts. **Die Oberfläche von metallischen Werkstoffen in ihrem Einfluss auf das Betriebsverhalten der Konstruktionsteile. II.** H. Wiegand. *Metalloberfläche*, v. 12, no. 3, Mar. 1958, p. 65-68.

Effect of protective coatings on metallic surfaces. Coatings produced by chemical and electrochemical reactions or diffusion. Coatings produced by welding, galvanic, and other processes.

8151* (French.) General Considerations on Galvanizing. **Considérations générales sur la galvanisation.** A. Herz. *Métallurgie et la Construction Mécanique*, v. 90, no. 2, Feb. 1958, p. 107 + 2 pages.

Factors influencing the covering capacity of Zn. Additions of Al. Standardization of pure Zn, secondary Zn, and zincs extracted from crucible ash. Alloying elements and their effects.

8152 The Analysis of Paints, Lacquers and Varnishes. N. W. Hanson. *Oil & Colour Chemists' Association, Journal*, v. 41, Mar. 1958, p. 203-257.

Methods and examples.

8153 Paint Faults and Remedies. H. Courtney Bryson. 184 pp. Scientific Surveys Ltd., London. (TP934.3 B84p)

A glossary of paint faults, including notes on causes and preventive measures.

8154 Are Pigments Used Efficiently? L. A. Sonsthagen. *Paint Manufacture*, v. 28, Mar. 1958, p. 71 + 6 pages.

Effect of variations in the specific surface of extenders or pigments on the relationship between pigment volume and vehicle volume. Effect of particle size reduction on the consistency of the mill paste and on the general rheology of the dispersion.

8155* Exterior Results of Emulsion Paints. John A. Gordon, Jr. *Paint and Varnish Production*, v. 48, no. 4, Mar. 1958, p. 27 + 9 pages.

Results of exposures made in the development of a modified acrylic synthetic polymer latex, Lytron 680, for exterior paints.

8156* Visual Evidence of Coating Theories. John C. Watts. *Pipe Line Industry*, v. 8, Mar. 1958, p. 36-39.

Laboratory and field data indicate reduced friction losses with internally coated pipe.

8157* New Machine for Thin Film Coatings. N. T. Shideler. *Pipe Line Industry*, v. 8, Mar. 1958, p. 48-50.

Revised pipe line priming machine applies coal tar-epoxy coating. Metered coating components are blended and fed directly to coating shoe.

8158 (English.) **Protection of Steel by Painting Against Atmospheric Corrosion.** J. C. Hudson. *Schweizer Archiv für Angewandte Wissenschaft und Technik*, v. 24, no. 2, Feb. 1958, p. 46-56.

Correct surface preparation before the priming coat of paint is applied to structural steel work. Design of structures and risk of corrosion. Paint thickness and conditions of application.

8159 Pigmentation of Starch Coating Colors With Mistron. *Sierra Talc & Clay Company, Technical Report* 43-T, Apr. 10, 1957, 17 pp. (TN941 Si17t Contin.)

The preparation, application, and properties obtained in starch coatings with 18, 25, and HGO-55 Mistron. A conventional coating clay and a precipitated $CaCO_3$ pigment are included for comparison purposes.

8160* (Czech.) Effect of Zinc Plating on the Mechanical Properties of Malleable Cast Iron. **Vliv pozinkování na mechanické vlastnosti temperované litiny.** Zdeněk Hostinský. *Slévárenstvi*, v. 6, no. 2; *Práce Československého Výzkumu Slévárenského*, v. 5, no. 3, Feb. 1958, p. 31-34.

Plating in molten Zn deteriorates mechanical properties. The repeated-impact strength of ferritic malleable cast iron is reduced by 18%, and pearlitic by 37%. Decrease is prevented by rapid cooling.

8161* (Russian.) Determining Brittleness of Bituminous Coatings. **Opredelenie khrupkosti bitumnykh pokrytii.** V. I. Zhukov and A. A. Kozlovskaia. *Stroitel'stvo Predpriiatii Neftianoi Promyshlennosti*, v. 2, no. 12, Dec. 1957, p. 4-7.

Brittleness is determined by penetration tests. For winter conditions bitumen should contain >2% S and >1% paraffin to which 10% rubber crumbs and from 3 to 5% green oil is added.

8162* (Russian.) Alloying of Weld Metal During Automatic Depositing of High-Speed Steel. **Legirovanie naplavlennogo metalla pri avtomaticheskoi naplavke bystrorezhushchikh stalei.** I. G. Liapichev. *Svarochnoe Proizvodstvo*, 1958, no. 1, Jan., p. 15-18.

Investigation of the effect of C, V, Mo, W, and Ti on properties of deposited high-speed steel. Chemical composition of weld metals based on P9 steel along with C, Ti, V, Mo, Mo+V, V+Mo+Ti, and W; investigation of their microstructure. The best cutting properties were obtained by the following comp.: 1.1% C; 4.6% Cr; 9.5% W; 1.7% V, and 2.7% Mo.

8163* (Russian.) Automatic Resistance-Arc Deposition of Metal. **Avtomaticheskaia kontaktno-dugovaia naplavka metalla.** N. I. Dotsenko. *Svarochnoe Proizvodstvo*, 1958, no. 2, Feb., p. 39-44.

Development of electrical equipment with adjustable inductance which permits putting into practice the highly efficient process of automatic resistance-arc deposition of metal in air and in liquids at voltages from 6 to 15 v. This process can be carried out with various electrodes in gaseous or liquid environments; it is possible to obtain metal layers of 0.3 to 3 mm. thickness, various chemical compositions, and varying hardness.

8164 Development of Protective Coatings Resistant to Synthetic Lubricating and Hydraulic Fluids. Robert W. Damm, George F. Salathe, and William A. McIntyre. *U. S. Air Force. Wright Air Development Center. WADC Technical Report* 56-80, *Supplement* 1, Oct. 1957, 175 pp. (TL507 Un3.18w Vis.)

8165 Roll Cladding Uranium-Zirconium and Uranium-Zirconium-Niobium Alloys With Zircaloy-2 for Plate-Type Fuel Elements. C. H. Bean, R. E. Macherey, and J. R. Lindgren. *U. S. Atomic Energy Commission, ANL*-5628, Feb. 1958, 288 pp. (UF767 Un3.1an Contin.)

8166 Metallizing and Its Application in Aircraft Gas-Turbine Components. Donald E. Hacker. *Welding Journal*, v. 37, Mar. 1958, p. 231-236.

Selection of proper spray material, base-metal preparation, spraying technique, and machining of deposit are emphasized.

8167* (Russian.) Chromium Boride and Its Use for Deposited Alloys. **Borid khroma i ego primenenie v naplavochnykh splavakh.** I. I. Iskol'dskii and S. L. Cherkinskaia. *Zhurnal Prikladnoi Khimii*, v. 31, no. 1, Jan. 1958, p. 25-33.

Nine compositions of CrB and Fe (powder) are studied with respect to the effect of CrB on the hardness of the deposited layer.

8168* (Russian.) Preparation of Aluminum and Chromium Phosphate Films on Aluminum and Its Alloys. **Poluchenie plenok fosfatov aliuminiia i khroma na aliuminii i ego splavakh.** I. V. Krotov, V. V. Grinina, and N. A. Zapol'skaia. *Zhurnal Prikladnoi Khimii*, v. 31, no. 1, Jan. 1958, p. 33-40.

Thermographic and chemical analysis of the passivated powders of Al and its alloys shows that $CrPO_4$, $AlPO_4$, and water are components of the film.

8169* (Russian.) Preparation of Fast-Drying Coatings From Semi-Drying Oils and Butyl Orthotitanate With a Polyester Resin Base. **Poluchenie bystrosokhnushchikh pokrytii na osnove poliefirnykh smol iz poluvysykhaiushchikh masel i butilortotitanata.** V. S. Kiselev and T. A. Ermolaeva. *Zhurnal Prikladnoi Khimii*, v. 31, no. 1, Jan. 1958, p. 111-116.

Mechanical properties of coatings with additions of butyl orthotitanate, and their stability against water and chemical reagents.

See also: **7829** (bitumen viscosity control); **8458** (precoated steel sheets); **8534** (Russian phosphating procedure); **8539** (floors for galvanizing plant); **8746** (Al pigments and choice of vehicles); **8923** (epoxidized polybutadiene coatings).

CONTROL SYSTEMS, COMPUTERS, AND SYSTEMS ENGINEERING

8170* High Performance Servos Can Be Used on Machine Tools. S. F. Watanabe. *Applied Hydraulics*, v. 11, Mar. 1958, p. 98 + 2 pages.

Design and operation of a servo controlled cam milling machine.

8171* (German.) Design and Properties of High-Quality Control Crystals. **Konstruktion und Eigenschaften von Schwingquarzen hoher Güte.** Gerhard Becker. *Archiv der Elektrischen Übertragung*, v. 12, no. 1, Jan. 1958, p. 15-25.

Design details concerning shape, processing, supporting, binding, and electrode configuration of the crystals in crystal clocks. Data on oscillating performance, parameters of the equivalent circuit, dependence on amplitude of the frequency, mechanical stability, influences of electrode shape on frequency, and influence of the vacuum on frequency and Q-factor.

8172 Numerical Control: Punched Tape or Cards? Malcolm L. Russell. *Automatic Control*, v. 8, no. 3, Mar. 1958, p. 6-9.

For certain applications there are several factors which can make one type of input a better choice than the other. Such elements as speed, cost, machining time, reading reliability, storage, and handling are covered.

8173 Applying Machine Control Computers. George H. Amber and Paul S. Amber. *Automatic Control*, v. 8, no. 3, Mar. 1958, p. 54-60.

Techniques of feedback and automatic preset for applications of computers to the piece part fabricating industry.

8174* (Russian.) Optimum Transients in Automatic Control Systems With Limited Valve Position. **Ob optimal'nykh perekhodnykh protsessakh v sisteme avtomaticheskogo regulirovaniia s ogranicheniem polozheniia reguliruiushchego organa.** E. K. Krug and O. M. Minina. *Avtomatika i Telemekhanika*, v. 19, no. 1, Jan. 1958, p. 10-25.

Determination of optimum transient processes for control systems including regulated units with dynamic properties and those with delay.

8175* (Russian.) Telemeter System With Code-Pulse Modulation. **Sistema teleizmereniia s impul'snokodovoi moduliatsiei.** G. V. Burdenkov. *Avtomatika i Telemekhanika*, v. 19, no. 1, Jan. 1958, p. 55-63.

The possibility of constructing telemetry systems based on magnetic elements with a rectangular hysteresis loop together with crystal triodes and diodes.

8176* Toroidal Transformers for an Analogue System of Machine Tool Control. D. A. Alexander. *British Institution of Radio Engineers, Journal*, v. 18, Feb. 1958, p. 71-81.

8177* A Correlation Between the Transient and Frequency Responses in Servomechanisms. Z. J. Jelonek and G. I. Boomer. *British Institution of Radio Engineers, Journal*, v. 18, Feb. 1958, p. 101-114.

Statistical evidence, obtained from the responses of a large number of servo systems of various types, is employed to set up empirical relations between selected parameters of the time and frequency responses.

8178* Automatic Control in Steel Strip Manufacture. G. Syke. *British Institution of Radio Engineers, Journal*, v. 18, Feb. 1958, p. 117-124.

Thickness gages on strip rolling mills and their use for automatic screw control, measurement and control of extension on skin-pass or temper mills, and automatic sorting of steel sheet and tin-plate on cut-up lines .

8179 Novel Applications of Computers. *Computers and Automation*, v. 7, Mar. 1958, p. 8-13.

Computers can be used to play music and bridge, control air traffic, calculate corn hybrids, translate languages, or analyze investments.

8180 Positioning Systems. III. John D. Cooney and Byron K. Ledgerwood. *Control Engineering*, v. 5, Mar. 1958, p. 99-114.

Descriptions of nine systems with full coverage of performance characteristics and their modes of operation.

8181 Electrochemical Methods for Process-Stream Analysis and Control. T. C. Wherry and D. D. DeFord. *Control Engineering*, v. 5, Mar. 1958, p. 115-121.

Principles of electroanalytical techniques applicable to control of plant processes.

8182 Reliability Testing Based on Poisson Distribution. C. M. Ryerson. *Electromechanical Design*, 1958, no. 4, Mar., p. 50-55.

A specific technique for determining if equipment is adequately engineered.

8183* (German.) A Pressure Gage for Electronic Computers. **Ein Druckgerät für elektronische Zähler.** Gerhard Becker. *ETZ, Elektrotechnische Zeitschrift*, v. 10, Ausgabe B, no. 2, Feb. 1958, p. 48-51.

Describes a pressure gage used for registering precision-frequency-measurements on quartz clocks with electronic computers.

8184 High Speed Computers in the Aircraft Industry. Frank P. Cozzone. *North Atlantic Treaty Organization, AGARD Report No.* 130, May 1957, 13 pp. (TL565 Ag11r Vis.)

The phenomenal growth of the use of high speed digital computers for solving typical problems associated with the aircraft industry. A variety of problems are capable of being solved in a practical manner. Pertinent comments as to the future role of the engineer.

8185* An Electrical Process Control System for Nuclear Power Plant. J. C. Nutter. *Nuclear Power*, v. 3, no. 23, Mar. 1958, p. 98-100.

A system based on the linear differential transformer.

8186* Simulation of the Operational Impedances of Synchronous Machines on Network Analyzers. Colin Adamson and A. M. S. El-Serafi. *Power Apparatus and Systems*, 1958, no. 34, Feb., p. 1373-1378.

8187* Analog and Digital Computers in the French Electric Power Production, Transmission, and Distribution Industry. Francois M. Cahen and Jean M. Carteron. *Power Apparatus and Systems*, 1958, no. 34, Feb., p. 1533-1538.

Use in hydroelectric, economic, atomic energy, and electric studies.

8188* (German.) Direct Derivative Rate Action in Control Loops With Carrier Frequency. **Direkte Vorhaltbildung bei Regelkreisen mit Trägerfrequenz.** Hegewaldt. *Regelungstechnik*, v. 6, no. 1, 1958, p. 2-9.

Controllers working with carrier frequency can easily be designed without contacts. Amplifiers for a narrow band each side of the carrier frequency suffice. A direct rate action derivative can be achieved through the use of filters. By selection of the unit elements a zero adjustment is possible and accomodation to the critical frequency of the control loop is achieved.

8189* (German.) Control and Automatic Regulation of Step Processes. **Steuerung und Regelung bei absatzweisem Betrieb.** W. Oppelt. *Regelungstechnik*, v. 6, no. 2, 1958, p. 52-59.

Typical cases of control and automatic regulating equipment for step processes. Use of computers.

8190* (English.) **Automatic Control of Open-Hearth Furnaces.** Wilhelm Liesegang. *Siemens Review*, v. 24, 1957, p. 141-145.

Study of control by regulating pressure, fueling rate, and roof temperature in connection with the supervision of control efficiency by monitoring the O_2 content of flue gases.

8191* (English.) **A Program-Controlled Printer for Data Processing.** Hans Kürner. *Siemens Review*, v. 24, 1957, p. 199-203.

Basic features and design of a digital data processing system, the devices and components used, and possibilities of furnishing output data in various digital and analog forms.

See also: **7711** (missile control systems); **7724** (digital computation of flight dynamics); **7832** (computers and exchanger design); **7837** (chemical reactor stability and control); **7858** (chemical process control); **7863** (automatic batch processing controls); **8278** (group redundancy and optimum reliability); **8651** (control of machine tool); **8653** (tool control to five millionths); **8662** (coordinate drilling machine with automatic positioning).

ELECTRICAL ENGINEERING

8192* (German.) A Novel Method for the Computation of Complicated and Highly Saturated Magnetic Circuits. **Eine neue Berechnungsmethode für Komplizierte, Stark Gesättigte Magnetische Kreise.** O. Benedikt. *Acta Technica Academiae Scientiarum Hungaricae*, v. 19, nos. 1/2, 1957, p. 169-191.

Scope of the "classical methods". Problems concerning the distribution of induction in relation to the distribution of potentials, solved by the "monographic" method described. Application to other problems connected with electric machines.

8193* (Russian.) Gas-Discharge Stabilizer for Heavy Direct Current. **Gazorazriadnyi stabilizator sil'nykh postoiannykh tokov.** A. M. Rezikian. *Akademiia Nauk Armianskoi SSR, Izvestiia. Seriia Fiziko-Matematicheskikh Nauk*, v. 10, no. 5, 1957, p. 99-106.

Theoretical determination of stabilizer based on the use of glow discharge present in the magnetic field.

8194 Recent Developments in Conductor Vibration Research. C. B. Rawlins. *Aluminum Company of America, Technical Paper No.* 13, 1958, 32 p. (TS550 A82t Contin.)

Discussion of work relating to calculation of the amount of power delivered by the wind and its dissipation in transmission lines, and conditions for balance of power input and power dissipation to prevent fatigue failures.

8195* (German.) The Conductance of Dipoles of Finite Length and Thickness. **Der Wirkleitwert von Dipolen endlicher Länge und Dicke.** Kurt Fränz, Paul A. Mann, and Johann Vocolides. *Archiv der Elektrischen Übertragung*, v. 12, no. 2, Feb. 1958, p. 49-53.

A family of dipoles with the same conductance at a given frequency is calculated. In order to calculate the conductance and the shape of a dipole, a finite number of integrals has to be evaluated and an ordinary differential equation of the first order has to be solved.

8196* (Russian.) Some Optimum Correlations for an Ideal Magnetic Amplifier Regulated by A.C. Signal. **Nekotorye optimal'nye sootnosheniia v ideal'nom magnitnom usilitele pri upravlenii signalom peremennogo toka.** K. S. Volchkov. *Avtomatika i Telemekhanika*, v. 19, no. 1, Jan. 1958, p. 85-94.

Analysis of the performance of an ideal saturating magnetic amplifier with an active load. Derivation of optimum correlations for amplifiers destined to amplify both a fixed frequency signal and a.c. signals of a given frequency band.

8197 Electrical Insulation Properties at Ultrahigh Temperatures. G. I. Duncan and M. M. Felger. *Electrical Engineering*, v. 77, Apr. 1958, p. 318-322.

Effects of temperatures up to 600 C on sheet and spool insulations for electronic transformers.

8198* Tripping Scheme by Microwave Gives High-Speed Transformer Protection. E. A. Cockey. *Electrical World*, v. 149, Mar. 10, 1958, p. 49 + 3 pages.

Transfer tripping scheme uses two tones for reliability. Squelch circuit prevents false tripping noise.

8199* Evaluation of System Transient Stability Requires Consideration of Three Criteria. B. L. Lloyd and C. A. DeSalvo. *Electrical World*, v. 149, Mar. 24, 1958, p. 80-83.

Stability studies require judgment of the type and severity of disturbances, operation of protective equipment, and system conditions at the time of fault.

8200* (Czech.) Disconnection of Small Induction Currents by Means of a High-Voltage Air-Blast Circuit-Breaker. **Vypínání malých indukčních proudů tlakovzdušným vypínačem vn.** František Houšt, Vladimír Homa, and Zdeněk Chalupa. *Elektrotechnický Obzor*, v. 47, no. 2, Feb. 1958, p. 78-83.

Results of systematic measurements under network conditions on an air-blast circuit-breaker of 22 kv., disconnecting currents in the range from 17.5 to 60 amp. regulated by air-core chokes. Extreme cases of circuit-breaking manifested by the formation of high voltages.

8201* (Czech.) Design of the Auxiliary Winding of Single Phase Asynchronous Motors. **Návrh pomocného vinutí jednofázových asynchronních motorů.** Jaroslav Štěpina. *Elektrotechnický Obzor*, v. 47, no. 2, Feb. 1958, p. 84-91.

Tables of the relative values for an optimum design of the auxiliary winding of single-phase asynchronous motors based on the short-circuit measurement of the main winding.

8202* (Czech.) De-Excitation of Large Alternators, Especially in the Short-Circuit Test Room. **Odbuzování velkých alternátorů zejména ve zkratovně.** Vladimír Novotný and Hana Moravová. *Elektrotechnický Obzor*, v. 47, no. 2, Feb. 1958, p. 99-104.

Survey of the methods of de-exciting large alternators. The short circuit alternator represents a special case with regard to the high exciting voltage in additional excitation and to the long time constants.

8203 (German.) Problems of Electrical Machines Cooled With Hydrogen. **Probleme bei wasserstoffgekühlten elektrischen Maschinen.** W. Mönnig. *Energietechnik*, v. 8, no. 1, Jan. 1958, p. 18-25.

A survey of the problems directly or indirectly connected with the H cooling of turbogenerators, phase changers, and other machines.

8204* (Russian.) Heating of Electron Gas and Carrier Processes in Conductors. **Razogrevanie elektronnogo gaza i protsessy perenosa v provodnikakh.** V. P. Shabanskii. *Fizika Metallov i Metallovedenie*, v. 5, no. 2, 1957, p. 193-202.

Kinetic equations for electron gas in metals were studied. Based on these, various carrier processes in conductors were investigated.

8205* (French.) The Hall Effect and Its Applications. **L'effet hall et ses applications.** Maurice Dumontel. *Journal des Recherches du Centre National de la Recherche Scientifique*, no. 39, June 1957, p. 131-135.

Relationship between Hall effect and the general electromagnetic induction laws. Evaluation of energies envolved. Requirements for the construction of a power amplifier including a reactive winding.

8206 How Relay Application Factors Affect Selection of Contact Materials. Zeke R. Smith. *Machine Design*, v. 30, Mar. 6, 1958, p. 129-133.

Relay design, operation, and application factors. Characteristics of contact materials. Environmental causes of contact failure.

8207* A Compendium of Grounding Techniques for Personnel and Equipment Protection. H. E. Heddesheimer. *Power Apparatus and Systems*, 1958, no. 34, Feb., p. 1225-1230.

8208* A Variable-Speed D-C Motor Drive Employing the Xatron, a Grid-Controlled Mercury Arc Rectifier. A. J. Humphrey and K. L. Shrider. *Power Apparatus and Systems*, 1958, no. 34, Feb., p. 1245-1251.

8209* Gas Flow and Heat Transfer in Conductor-Cooled Machines. L. T. Rosenberg. *Power Apparatus and Systems*, 1958, no. 34, Feb., p. 1267-1271.

Procedure for determining the flow of H in the ducts of axial-flow stator cores and coils. Determination of surface-heat transfer coefficients for the duct configurations and range of gas conditions commonly employed in conductor-cooled machines.

8210* The Effect of Transformer-Oil-Preservation Methods on the Dielectric Strength of Oil. R. B. Kaufman, J. L. Pierce, and E. R. Uhlig. *Power Apparatus and Systems*, 1958, no. 34, Feb., p. 1315-1321.

Bubbles can form in oil being preserved by a pressure-type system. These reduce the electric strength of the oil and of the insulation structure of the transformer and increase the probability of field failure.

8211* Metal-Clad 4,160-Volt 350-Mva Switchgear With Symmetrical Ratings. E. B. Rietz, G. O. Perkins, and W. A. Carter. *Power Apparatus and Systems*, 1958, no. 34, Feb., p. 1397-1403.

8212* Engineering Design of the EBWR Facility. D. C. McClintock. *Power Apparatus and Systems*, 1958, no. 34, Feb., p. 1492-1498.

A nuclear reactor replaces the boiler as the steam-generating unit. Steam is produced within the core of the reactor and utilized directly by the turbine.

8213* A Magnetic De-Ion Air Breaker for 750 Mva, 13.8 Kv. Russell Frink and J. M. Kozlovic. *Power Apparatus and Systems*, 1958, no. 34, Feb., p. 1516-1520.

8214* Effects of Electron Irradiation on the Electrical Properties of Mylar. Emanuel L. Brancato and James G. Allard. *Power Apparatus and Systems*, 1958, no. 34, Feb., p. 1539-1545.

Effects of dose and dose rate were studied. Rate of irradiation as well as the length of postirradiation time markedly influence the magnitude of the observed changes.

8215* (English.) **Electrical Measuring Transmitters Operating on the Force-Balance Principle.** Heinz Kronmüller. *Siemens Review*, v. 24, 1957, p. 151-155.

Balancing a given torque by that of an energized coil in a magnetic field is applied to transduce variables such as pressures and differential pressure into impressed currents by means of measuring transmitters.

8216* (English.) **Transistors in Heavy-Current Installations.** Hans Zenneck and Manfred Tschermak. *Siemens Review*, v. 24, 1957, p. 155-161.

Developing a transistor amplifier, a transistor two-step controller, and a transistor grid-control unit, for the construction of standard, simple, and highly efficient controllers and regulating systems from a few watts up to several thousand kw.

8217* (Dutch.) Load on a Multiple Arc Welding Plant. Especially on the Power Transformer of a Multiple-Arc Reactor Welding Set. **Over de belasting van een centrale lasinstallatie in het bijzonder van de voedingstransformator van een batterij lassmoorspoelen.** J. Wildeboer. *Smit Mededlingen*, v. 12, no. 4, Oct.-Dec. 1957, p. 149-155.

Compares the delta-star, delta-interstar, and star-interstar connections of the central power transformer of a multiple-arc reactor welding set.

8218* (German.) The Dependence of Electric Arc Emission Upon External Effects. **Die Abhängigkeit der Emission eines elektrischen Lichtbogens von äusseren Einflüssen.** W. Lochte-Holtgreven. Paper from Proceedings of the Colloquim Spectroscopicum Internationale VI. Amsterdam. May, 1956. *Spectrochimica Acta* (Supplement), 1957, p. 111-118.

Fundamental concepts of line-intensities and of continuum intensities. Temperature effect on line intensity. Light sources with time-variable temperature; spark discharge. Obtaining high temperatures in arc-discharges. Use of intermittent currents.

8219* (German.) Concentration Distribution of a Metal Vapor in a Cathode D.C. Arc. **Konzentrationsverteilung des Metalldampfes im Glimmschichtbogen.** P. W. J. M. Boumans. Paper from Proceedings of the Colloquium Spectroscopicum Internationale VI. Amsterdam. May, 1956. *Spectrochimica Acta* (Supplement), 1957, p. 146-151.

Formulas were derived from a differential equation. The influences were reduced to radius R of the arc column, source of intensity Q, and a universal parameter U for other factors.

8220* (German.) The Production of Electric Energy With Radioactive Substances. **Gewinnung elektrischer Energie mit radioaktiven Substanzen.** Jürgen Hacke. *VDI Zeitschrift*, v. 100, no. 8, Mar. 11, 1958, p. 327-328.

The nuclear energy set free during the decomposition of radioactive substances can be converted directly into useful electric energy by means of the so-called "nuclear batteries".

8221 Techniques for Insulating Wire and Cable With Silicone Rubber. D. C. Youngs, D. J. Badamo, and M. N. Culver. *Wire and Wire Products*, v. 33, Mar. 1958, p. 285 + 6 pages.

Studies on the extrusion of silicone rubber and techniques used in insulating electrical conductors with tapes of the same material.

8222* (Russian.) Investigation of Temperature Dependence of Electric Conductivity and Thermoelectromotive Force of Silicides. **Issledovanie temperaturnoi zavisimosti elektroprovodnosti i termoelektrodvizhushchei sily silitsidov.** E. N. Nikitin. *Zhurnal Tekhnicheskoi Fiziki*, v. 28, no. 1, Jan. 1958, p. 23-25.

Manganese silicide, $MnSi_2$, and CoSi are characterized by a steady increase of electric conductivity with decrease in temperature. In the range from −200 to −800 C the values of electric conductivity change by a factor of only 2 to 3.

See also: **7813** (ceramic dielectrics for capacitors); **8187** (computers in the French electric power system).

ELECTROCHEMISTRY

8223* (French.) Observations on Some Anodizing Processes. **Oxydation anodique. Observations et perfectionnements recents.** F. Flusin. *Alluminio*, v. 27, no. 1, 1958, p. 13-18.

Reviews the recent French development of bulk anodic treatment for small articles. Materials used in the plant and technical aspect of the problem. Bulk treatment for large articles will soon be possible.

8224 An Electromotive Force Series in Molten Lithium Chloride-Potassium Chloride Eutectic. H. A. Laitinen and C. H. Liu. *American Chemical Society, Journal*, v. 80, Mar. 5, 1958, p. 1015-1020.

Electrode potentials were measured in a LiCl-KCl melt at 450 C for a number of oxidation-reductions systems. Most of the systems consisted of metal ion-metal couples with the metal ion in its lowest oxidation state.

8225 Mechanism of the Electrochemical Reduction of Phenyl Ketones. Philip J. Elving and Joseph T. Leone. *American Chemical Society, Journal*, v. 80, Mar. 5, 1958, p. 1021-1029.

8226* (English.) **Newer Methods of Determining Electrolytic Conductivity.** V. S. Griffiths. *Analytica Chimica Acta*, v. 18, nos. 1-2, Jan.-Feb. 1958, p. 174-179.

Theory, construction, and use of a three-terminal transformer ratio-arm bridge. By using special cells the use of contacting metal electrodes can be eliminated.

8227 Electrolytic Production of Sodium Perchlorate Using Lead Dioxide Anodes. Joseph C. Schumacher, David R. Stern, and Paul R. Graham. *Electrochemical Society, Journal*, v. 105, Mar. 1958, p. 151-155.

Lead dioxide was investigated as an anode substitute for Pt.

8228 Anodic Polarization of Titanium in Nonaqueous Base Etching Solutions. Morris Eisenberg and Robert E. DeLaRue. *Electrochemical Society, Journal*, v. 105, Mar. 1958, p. 162-169.

Studies in Hf. Solvents included ethylene glycol, dioxane, and tetrahydrofuran. A direct method using Ni reference electrodes was employed.

8229 Bright Anodising by the Modified Erftwerk Process. R. Peek and A. W. Brace. *Electroplating and Metal Finishing*, v. 11, no. 3, Mar. 1958, p. 71 + 6 pages.

By addition of brighteners the optimum brightness can be extended and good results obtained 99.8% on pure Al. Bath characteristics, conditions for bright anodizing, and operating experience are discussed.

8230 Electrometric Stopped Flow Measurements of Rapid Reactions in Solution. I. Conductivity Measurements. II. Glass Electrode pH Measurements. John A. Sirs. *Faraday Society, Transactions*, v. 54, pt. 2, Feb. 1958, p. 201-212 + 1 plate.

8231* (Czech.) Preparation of Zirconium by Reduction of Zirconium Tetrachloride and by Electrolytic Method. **Příprava zirkonia redukcí chloridu zirkoničitého a elektrolytickou cestou.** František Plzák and Václav Klabik. *Hutnické Listy*, v. 13, no. 1, Jan. 1958, p. 26-33.

Technological process of Zr preparation by reducing $ZrCl_4$ with Mg and by electrolysis of molten potassium fluozirconate. Technical and economic comparison of different ways of preparing Zr.

8232 An Electrochemical Investigation of Hydrogen Producing Reactions Catalyzed by Nickel and Nickel-Palladium Cathodes. James P. Hoare and Sigmund Schuldiner. *Journal of Physical Chemistry*, v. 62, Feb. 1958, p. 229-233.

Hydrogen overvoltage measurements in acid solutions of Ni, Pd, and a series of Ni-Pd alloys were made. The H producing mechanisms are discussed.

8233 (Serbian.) Anodic Oxidation of Ferrochromium. **O anodnoi oksidatsii ferokhroma.** B. S. Brchich, B. Meiach, and B. Trpevska. *Khemisko Drushtva Beograd, Glasnik*, v. 22, no. 4, 1957, p. 233-243.

Investigation in NaCl, Na_2CrO_4, and H_2CrO_4 of various concentrations.

8234* (Russian.) Electrical Method of Depositing Metal Coatings. **Elektricheskie metody naneseniia metallopokrytii.** I. S. Shokhov. *Mashinostroitel'*, 1958, no. 1, Jan., p. 23-24.

Procedures for coating metallic and non-metallic articles.

8235* Some Thoughts on the Treatment of Surfaces by Anodic Oxidation. J. M. Kape. *Metal Finishing Journal*, v. 4, Feb. 1958, p. 39 + 5 pages.

Method produces a range of textured and colored Al surfaces possessing differing degrees of opacity ranging from none to fully opaque. Use of sulfuric, chromic, oxalic, malonic, sulfamic, and sulfosalicylic acid electrolytes is described.

8236 (Russian.) Effect of Electrolysis and Electrolyte Variables on the Mechanical Properties of Electrolytic Copper. **Zavisimost' mekhanicheskikh svoistv elektroosazhdennoi medi ot rezhima elektroliza i sostava elektrolita.** A. M. Ginberg and Iu. A. Kliachko. *Metallovedenie i Obrabotka Metallov*, 1958, no. 2, Feb. 1958, p. 35-37.

Yield strength and specific elongation of electrolytic Cu can be controlled by current density during electrolysis and by introduction of surface-active substances into the electrolytic Cu can be controlled by current density during electrolysis and by introduction of surface-active substances into the electrolyte. The increase in strength results from orientation of the grains in the deposit.

8237 Electrolytic Polishing. New Equipment With Provision for Circulating the Electrolyte. *Metallurgia*, v. 57, no. 340, Feb. 1958, p. 107-108.

8238* (French.) Electrolytic Separation of Hafnium and Zirconium in a Molten Medium. **Sur une séparation du hafnium et du zirconium par électrolyse en milieu fondu.** G. Chauvin, H. Coriou, and J. Huré. *Metaux. Corrosion-Industries*, v. 32, no. 388, Dec. 1957, p. 469-474.

Survey of electrolytic methods. Separation of Zr-Hf by electrolysis of the molten salts. Effect of the Hf proportion in the bath. Effect of voltage and current density.

8239* Bright Nickel Plating. II. Process Details. D. J. Fishlock. *Product Finishing*, v. 11, Feb. 1958, p. 80-94.

Polishing requirements and other pretreatments; plant requirements including tanks, barrels, filters, heaters, power supplies, bath agitation, jigs, and anodes.

8240 The Determination of the Thickness, Dielectric Constant, and Other Properties of Anodic Oxide Films on Tantalum From the Interference Colours. L. Young. *Royal Society, Proceedings*, v. 244, ser. A, Feb. 25, 1958, p. 41-53.

8241* (English.) **Study on Anode-Area in Electrolytic Polishing of Copper.** Masao Naruse and Akira Nannichi. *Technology Reports, Tôhoku University*, v. 22, no. 1, 1957, p. 29-39.

A cell-voltage-anode area diagram was obtained for the case of fixed current intensity, and a current density-anode area diagram for the case of fixed cell voltage which suggest optimum design for electropolishing apparatus.

8242* (English.) **Studies on Electrolytic Refining of Zinc. III. Behavior of Lead Peroxide Suspended in Zinc Electrolyte.** Motoo Watanabe and Seitaro Fukushima. *Tôhoku University, Science Reports of the Research Institutes, Ser. A. Physics, Chemistry, Metallurgy*, v. 10, no. 1, Feb. 1958, p. 68-76.

8243* (Russian.) Study of Electrothermic Processes in Zinc and Lead Production. **Elektrotermicheskie protsessy v svintsovo-tsinkovoi promyshlennosti.** M. M. Lakernik. *Tsvetnye Metally*, v. 31, no. 2, Feb. 1958, p. 20-27.

Concentrates of the following composition were studied: 4 to 6% C; 15 to 20% Pb; 20 to 30% Zn; 10 to 12% Fe; and about 20% S. Concentrates were subjected to the following treatments: roasting with a reduction of the main mass of Fe to cast iron, roasting to convert all Fe into slag, partial roasting with conversion of a part of the Fe into matte, and the remainder into slag.

8244* (German.) Electrolytic Decomposition of Indium and Thallium. **Die elektrolytische Trennung von Indium und Thallium.** W. Kangro and Fr. Weingärtner. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 11, no. 2, Feb. 1958, p. 70-72.

Owing to the different oxidation capacities of their monovalent ions, In and Tl can be decomposed and obtained in pure form.

8245* (Russian.) Electrolytic Precipitation of Pb-In Alloy. **Elektrolitícheskoe osazhdenie splava svintsa-indii.** M. A. Shluger, A. I. Lipin, and P. P. Telnykh. *Zhurnal Prikladnoi Khimii*, v. 31, no. 1, Jan. 1958, p. 71-77.

Effect of conditions of electrolysis on the composition of the cathode precipitate; electrochemical study of the precipitation process of the alloy; structural and microhardness of coatings from the electrolytic alloy.

See also: **7935** (anodic oxidation of lead acetate solutions); **8098** (conductivity of chlorinated hydrocarbons); **8451** (electrolytic production of super-purity Al); **8475** (corrosion testing of Zn plate on steel); **8501** (electrolytic Cr and cavitation); **8532** (plating test for clean wire surfaces); **8697** (structure of anodic coatings on Al); **8740** (electropolishing and electroetching cermets).

ELECTRONICS

8246 New Technique for Measuring Transducer Blocked Impedance. Gerald A. Sabin. *Acoustical Society of America, Journal*, v. 30, Feb. 1958, p. 146-150.

A pulsing technique for measuring the blocked impedance of an electroacoustic underwater sound transducer is described.

8247* (German.) Wave Propagation in a Diaphragm Wave Guide and a Corrugated Wave Guide. **Wellenausbreitung in einm Blenden-Hohlleiter und einem gesickten Hohlleiter.** Gerhard Piefke. *Archiv der Elektrischen Übertragung*, v. 12, no. 1, Jan. 1958, p. 26-34.

The influence of corrugations or diaphragms applied at periodic intervals in a circular loss-less waveguide is theoretically investigated. The spacing of the corrugations or diaphragms, i.e. the thickness of the diaphragms plus their interval, is assumed to be far smaller than the guide wavelength.

8248* (German.) The Description of Lossy Quadripoles of the Microwave Area by Shifting the Potential Nodal Points. **Eine Beschreibung verlustbehafteter Vierpole des Mikrowellengebietes durch Spannungsknotenverschiebungen.** Friedrich Gemmel. *Archiv der Elektrischen Übertragung*, v. 12, no. 2, Feb. 1958, p. 76-80.

Equations are derived that describe the dependence of the VSWR and the position of the voltage node on the input line of a lossy quadripole, on the position of the short-circuiting slide on its output line.

8249* (French.) Rotating Field Observer. **Observateur de champs tournants.** Jacques Ducloz and René Perret. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences*, v. 246, no. 6, Feb. 10, 1958, p. 913-916.

The direct and inverse components of an unbalanced distribution were revealed by a cathode ray oscillograph with triphased magnetic deviations.

8250* (French.) Statistics of Compensated Divalent Impurities in Semiconductors. **Statistique des impuretés divalentes compensées dans les semi-conducteurs.** Wladimir Mercouroff. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences*, v. 246, no. 8, Feb. 24, 1958, p. 1175-1177.

Variation of the number of free carriers with temperature can be changed considerably by the introduction of a monovalent compensating impurity of a type contrary to the divalent impurity.

8251 Controlled Saturation in Transistors and Its Application in Trigger Circuit Design. I. N. F. Moody. *Electronic Engineering*, v. 30, Mar. 1958, p. 121-127.

A study of carrier storage in both saturated and non-saturated transistors. This leads to a concept known as "controlled saturation", which defines the maximum charge storage the transistor can exhibit whether saturated or not.

8252 Transistor Circuits for Use With Gas-Filled Multi-Cathode Counter Valves. J. B. Warman and D. M. Bibb. *Electronic Engineering*, v. 30, Mar. 1958, p. 136-139.

A technique which enables complex digital circuits using both transistors and Dekatrons to operate from a low-voltage power supply. A transistor d.c. converter is used to generate the 475v. h.t. supply. Output pulses from the Dekatron cathodes drive transistor circuits. A transistor blocking oscillator feeds stepping pulses to Dekatron guide cathodes and a similar circuit is used for resetting the Dekatron to its home cathode.

8253 The Design of Function Generators Using Silicon Carbide Non-Linear Resistors. E. Brown and P. M. Walker. *Electronic Engineering*, v. 30, Mar. 1958, p. 154-157.

Silicon carbide resistors, the effective current-voltage characteristics of which have been modified by series and parallel linear resistors, are employed as input or feedback components of an operational amplifier to obtain non-linear function generators. The design of square law and sine units having a high accuracy is described.

8254 Transistors and Diodes in Strong Magnetic Fields. Henry A. Kampf. *Electronic Industries*, v. 17, Mar. 1958, p. 71-73.

Transistors and semi-conductor diodes can be expected to give much better performance in a magnetic field environment than vacuum tubes; for most applications the magnetic effects can be effectively reduced to zero by choosing a good Si device instead of Ge.

8255* Transmission-Line Low-Pass Filters. F. Charman. *Electronic & Radio Engineer*, v. 35, Mar. 1958, p. 103-111.

Design methods for the V.H.F. and U.H.F. bands.

8256 Low Noise Tunable Preamplifiers for Microwave Receivers. M. R. Currie and D. C. Forster. *I.R.E. Proceedings*, v. 46, Mar. 1958, p. 570-579.

8257 The Effects of Short Duration Neutron Radiation on Semiconductor Devices. W. V. Behrens and J. M. Shaull. *I.R.E. Proceedings*, v. 46, Mar. 1958, p. 601-605.

Of the transistor electrical parameters altered by irradiation, most significant were the decrease in common emitter forward current gain (β) and the increase in collector diode reverse leakage current. Semiconductor diodes suffered an increase in forward resistance and a decrease in back resistance in reasonable accord with the degree of neutron irradiation, while the solid-electrolyte batteries were not permanently affected.

8258* (Spanish.) V-Reflex Antenna for a Radar Information Station. **Antena v-reflex para una estacion de radar de informacion.** Giswalt von Trentini and Erik J. Kirksceth. *Instituto de Investigaciones Cientificas y Tecnicas de las Fuerzas Armadas. Boletin de Publicaciones*, v. 1, no. 11, Dec. 1957, p. 19-32.

The antenna described was provided with distance indication and an azimuth angle. By means of a semitransparent surface in the plane of the antenna opening, multiple reflections are created producing a more uniform illumination. Efficiency is comparable to that of a parabolic antenna.

8259 An Analytical Study of Scattering by Thin Dielectric Rings. Lloyd L. Philipson. *IRE Transactions on Antennas and Propagation*, v. AP-6, no. 1, Jan. 1958, p. 3-8. (TK1 In6.6ap Vis.)

Analysis of propagation of surface waves is developed under two assumptions: the incident field is the free space field of the source, and the scattered field tends asymptotically to zero as the radial thickness of the ring approaches zero.

8260 On the Propagation of Surface Waves Over an Infinite Grounded Ferrite Slab. Robert L. Pease. *IRE Transactions on Antennas and Propagation*, v. AP-6, no. 1, Jan. 1958, p. 13-20. (TK1 In6.6ap Vis.)

A theoretical study of propagation along an infinite plane conductor coated with a layer of ferrite material subjected to a constant external magnetic field.

8261 Scattering of Electromagnetic Waves in Beyond-the-Horizon Radio Transmission. David I. Paul. *IRE Transactions on Antennas and Propagation*, v. AP-6, no. 1, Jan. 1958, p. 61-65. (TK1 In6.6ap Vis.)

8262 Mechanical and Electrical Tolerances for Two-Dimensional Scanning Antenna Arrays. Robert S. Elliott. *IRE Transactions on Antennas and Propagation*, v. AP-6, no. 1, Jan. 1958, p. 114-120. (TK1 In6.6ap Vis.)

An analysis of the effect on radiation pattern of random errors in the construction of a two-dimensional scanning array.

8263 Photoelectric Cells. A Review of Progress. James D. McGee. *IRE Transactions on Component Parts*, v. CP-5, no. 1, Mar. 1958, p. 2-23. (TK1 In6.6cp Vis.)

A review of the various devices and the underlying physical principles that produce photoelectric effects.

8264 Low-Temperature Irradiation of *n*-Type Germanium. J. W. Cleland and J. H. Crawford, Jr. *Journal of Applied Physics*, v. 29, Feb. 1958, p. 149-151.

Annealing studies subsequent to irradiation reveal no evidence of thermally unstable defect states between 10 and 95 K. Annealing above 95 K indicates the presence of thermally unstable minority carrier traps of the type previously observed following irradiation at 120 K.

8265 Generation Recombination Noise in Intrinsic and Near-Intrinsic Germanium Crystals. J. E. Hill and K. M. van Vliet. *Journal of Applied Physics*, v. 29, Feb. 1958, p. 177-182.

Measurements on noise in Ge single crystals at temperatures between 300 and 450 K.

8266* (French.) Research and Improvement of R.F. Ion Sources With High Currents. **Au sujet de quelques recherches et ameliorations des sources H.F. a grand débit.** J. Depraz.

Journal de Physique et le Radium, v. 19, no. 1, Jan. 1958, p. 86-87.

The currents obtained were 4 mA with about 200 watts R.F. and average currents 1 mA with very little R.F. power, about 30 watts.

8267 Where to Use the New Semiconductor Materials. Robert K. Willardson and Theodore S. Shilliday. *Materials in Design Engineering*, v. 47, Mar. 1958, p. 114-118.

The properties of various binary semiconducting compounds are discussed in relation to present or potential applications in transistors, rectifiers, thermistors, and optical, galvanomagnetic, and thermoelectric devices.

8268 (English.) **General Properties of Frequency-Converting Networks.** S. Duinker. *Philips Research Reports*, v. 13, Feb. 1958, p. 37-78.

Mathematical analysis. (To be continued.)

8269 Electron-Hole Recombination Statistics in Semiconductors Through Flaws With Many Charge Conditions. Chih-Tang Sak and W. Shockley. *Physical Review*, v. 109, ser. 2, no. 4, Feb. 15, 1958, p. 1103-1115.

8270* (Russian.) Influence of Dielectric Film on Attenuation of H_{01}-Wave in a Rectilinear Waveguide Close to Circular. **Vliianie dielektricheskoi plenki na zatukhanie volny H_{01} v priamolineinom volnovode, blizkom k krugovomu.** B. Z. Katsenelenbaum. *Radiotekhnika i Elektronika*, v. 3, no. 1, Jan. 1958, p. 38-45.

Calculation of the additional attenuation for H_{0m} waves caused by a small deformation of the circular waveguide during internal deposition of the semi-conductive film.

8271* (Russian.) Isochronous Traveling-Wave Tube. **Izokhronnaia lampa begushchei volny.** G. F. Filimonov. *Radiotekhnika i Elektronika*, v. 3, no. 1, Jan. 1958, p. 85-93.

By synchronizing movement of the electron beam and the wave, it is possible to increase the H.F. field power in the tube by 3 db.

8272* (Russian.) The Effect of Load on Mutual-Synchronous Operation of Two Reflex Klystrons. **Vliianie nagruzki na vzaimno-sinkhronnuiu rabotu dvukh otrazhatel'nykh klistronov.** A. I. Kostienko and G. P. Liubimov. *Radiotekhnika i Elektronika*, v. 3, no. 1, Jan. 1958, p. 112-115.

Dependence of the width of the synchronization band and electron tuning on impedance-frequency characteristic of the load was studied.

8273* (Russian.) On the Theory of Scattering of Electromagnetic Waves on a Statistically Uneven Surface. **K teorii rasseianiia elektromagnitnykh voln na statisticheski nerovnoi poverkhnosti.** F. G. Bass and V. G. Bocharov. *Radiotekhnika i Elektronika*, v. 3, no. 2, Feb. 1958, p. 180-185.

Application of the disturbance theory to the above problem.

8274* (Russian.) Rectifying Contact Impedance of Germanium and Silicon Detectors at Microwave Frequencies. **Polnoe soprotivlenie vypriamliaiushchego kontakta germanievykh i kremnievykh detektorov na sverkhvysokikh chastotakh.** N. A. Penin and N. E. Skvortsova. *Radiotekhnika i Elektronika*, v. 3, no. 2, Feb. 1958, p. 267-275.

8275* (English.) **A Transistor Two-Step Controller.** Claus Kessler. *Siemens Review*, v. 24, 1957, p. 169-173.

As an extension of the Siemens standard series of magnetic amplifiers a transistor two-step controller was developed which, by using transistors operating as switches, gives an output power of 100 w.

8276* (English.) **An Electronic Limit-Value Monitor.** Heinrich Kalusche and Viktor Stigler. *Siemens Review*, v. 24, 1957, p. 177-179.

The limit-value monitors operate without reaction on readings and furnish a clear correlation between alarm signal and measured value. As the alarm signal and measured value. As the alarm signal is of d.c. voltage, no restrictions exist as to the length or layout of the line.

8277* (German.) Magnetic Amplifier for Electrical Precipitator Current Supply. **Magnetverstärker zur Stromversorgung Elektrofilteranlagen.** Rudolf Weppler and Ernst Schwarz. *Siemens Zeitschrift*, v. 32, no. 1, Jan. 1958, p. 9-17.

Current-regulating and voltage-regulating amplifiers; requirements of an electrical precipitator.

8278* Optimum Design for Reliability, the Group Redundancy Approach. James H. S. Chin. *Sperry Engineering Review*, v. 11, no. 1, Mar. 1958, p. 16-21.

Group redundancy consists of two sets of circuits which form a redundant group. It has the advantage of high reliability improvement factor at a relatively small increase in over-all engineering effort.

8279* Gated Filter MTI. Angelo F. Orazio. *Sperry Engineering Review*, v. 11, no. 1, Mar. 1958, p. 35-40.

How range gates and filters may be combined to obtain high clutter rejection in moving target indication systems. Typical techniques and circuits. Clutter rejection is calculated for a condition in which the pulse spectrum has been broadened by antenna scanning noise.

8280 Routine Crystal Orientation of Germanium and Silicon by High-Intensity Reflectograms. G. H. Schwuttke. *Sylvania Technologist*, v. 11, no. 1, Jan. 1958, p. 2-5.

Two optical methods for the orientation of single crystals of Ge and Si. Both methods employ light beams to produce reflectograms from the principal crystal faces.

8281 Intermetallic Semiconductors. Henry T. Minden. *Sylvania Technologist*, v. 11, no. 1, Jan. 1958, p. 13-25.

Synthesis, purification, single crystal growth, properties, and applications of InSb, InAs, InP, GaAs, CdTe, HgTe, and Bi_2Te_3.

8282 (German.) Technical Electrodynamics. **Technische Elektrodynamik. v. II.** Internal Electronics. **Innere Elektronik. Pt. II.** Free Space Charge Electronics. **Elektronik freier Raumladungen.** Franz Ollendorff. 620 pp. 1957. Springer-Verlag, Vienna. (QC631 OL4t)

Fields and their single and multiple electrical control; space charge oscillations; magnetic and electromagnetic control.

8283 Topological Formulas for Network Functions. Wataru Mayeda and Sundaram Seshu. *University of Illinois, Engineering Experiment Station Bulletin No.* 446, 1957, 35 pp. (T1 I6b Vis.)

8284* Unusual Transistor Circuits. P. L. Burton and J. Willis. *Wireless World*, v. 64, Mar. 1958, p. 107-110.

Gating, limiting, and other operations, mainly for pulse work.

8285* (German.) The Theory of Thermoelectric Effects in Semiconductors. **Zur Theorie der thermoelektrischen Effekte in Halbleitern.** Otfried Madelung. *Zeitschrift für Naturforschung*, v. 13a, no. 1, Jan. 1958, p. 22-25.

Mathematical analysis of equations to define the density of energy flow; use of Boltzmann's principle of immobility.

8286* (Russian.) Calculation of the Dependence of the Current Amplification Coefficient on the Emitter Current in Germanium Triodes for Injection and Extraction at High Temperatures. **Raschet zavisimosti koeffitsienta usileniia po toku ot toka emittera v germanievykh splavnykh triodakh dlia rezhimov in'ektsii i ekstraktsii pri vysokikh temperaturakh.** L. L. Makovskii. *Zhurnal Tekhnicheskoi Fiziki*, v. 28, no. 1, Jan. 1958, p. 52-54.

Theoretical interpretation of previously obtained experimental data.

8287* (Russian.) New Semiconducting Compounds. **Novye poluprovodnikovye soedineniia.** V. P. Zhuze, V. M. Sergeeva, and E. L. Shtrum. *Zhurnal Tekhnicheskoi Fiziki*, v. 28, no. 2, Feb. 1958, p. 233-236.

Synthesis and properties of $CuFeSe_2$, $CuFeTe_2$, $AgFeSe_2$, and $AgFeTe_2$.

See also: **7803** (ceramics for communication equipment); **8136** (chemical bonds in semiconducting $CoSb_3$); **8333** (radar sonde for upper air measurements); **8585** (galvanomagnetic effect in Ge); **8590** (impurity bands in Ge); **8644** (photoconductivity of Ag-Zn alloys); **8647** (Hall effect in Ni); **8894** (recombination of excess carriers in semiconductors); **8895** (microwave dielectrics of $BaTiO_3$).

ENGINEERING ECONOMICS

8288 Demand for Engineers—1957. Pt. I. 16 pp. 1957. Engineers Joint Council, New York. (TA157 En33d Over.)

A slight reduction was shown in 1957 in the over-all demand for engineers.

8289* The Economics of Plant Renewal and Replacement. C. W. Griffiths. *Institution of Mechanical Engineers, Proceedings*, v. 171, no. 13, 1957, p. 469-493 + 2 plates.

Type-for-type replacement of plant on an age or wear-and-tear basis is steadily giving way to replacement by improved, different, or more efficient machines.

8290* Uranium—The World Picture. Phillip L. Merritt. *Mining Congress Journal*, v. 44, Feb. 1958, p. 84 + 6 pages.

A review of the industry in 1957, with data on ore reserves and production.

8291 The "Shortage" of Scientific and Engineering Manpower in the United States, 1957. C. A. McHahan, et al. 38 pp. 1957. Air Research and Development Command, Lockland Air Force Base, Texas. (TA157 M22s)

A survey of relevant published and unpublished information.

8292 Trends in Education and Utilization of Technical Manpower. A Critical National Issue. 25 pp. 1957. Council for Technological Advancement, Washington, D. C. (T73 C83t)

An analysis of the problem; possible solutions.

8293 Water Requirements of the Rayon- and Acetate-Fiber Industry. Orville D. Mussey. *U. S. Geological Survey Water-Supply Paper* 1330-D, 1957, p. 141-179. (QE75 Un3w Contin.)

The results of a survey of the quantitative and qualitative water requirements of the rayon- and acetate-fiber manufacturers are presented.

FLUID MECHANICS

8294 (Russian.) New High-Efficiency High-Pressure Centrifugal Fans for Mines. **Novye shakhtnye vysokonapornye tsentrobezhnye ventiliatory bol'shoi proizvoditel'nosti.** V. S. Pak and V. D. Semenenko. *Akademiia Nauk Ukrains'koi RSR, Dopovidi*, 1958, no. 1, p. 41-44.

Four new centrifugal fans are announced which have a larger volume and higher static efficiency than other earlier high-pressure models.

8295* (German.) Turbulence and Wave Excitation. **Turbulenz und Wellenanfachung.** K. Schuster. *Annalen der Physik*, v. 20, nos. 7-8, 1957, p. 381-385.

Waves with exponentially increasing amplitude ("regenerated waves") may expand against the direction of current in a filled channel. A formula for the critical value of the Reynold's number may be derived from conditions responsible for such waves.

8296* Calculation of Terminal Falling Velocity of Particles in Fluids. René Jottrand. *British Chemical Engineering*, v. 3, Mar. 1958, p. 143-146.

A rapid method for calculating the rate of fall of particles in fluids (over a wide range of Reynolds numbers) without the need to apply techniques of successive approximation.

8297* (German.) Heat and Mass Exchange in Forced Flow Around Bodies of Various Shapes. **Wärme-und Stoffaustausch bei erzwungener Strömung an Körpern verschiedener Form. II.** O. Krischer and G. Loos. *Chemie-Ingenieur-Technik*, v. 30, no. 2, Feb. 1958, p. 69-74.

Calculation of the mass transfer coefficient. The shell surface and its flow length in the case of bodies with part of the surface concave, are suitable reference values. For higher Reynolds numbers the true exchange surface must be used as the reference value.

8298 Longitudinal Mixing of Fluids Flowing in Circular Pipes. Octave Levenspiel. *Industrial and Engineering Chemistry*, v. 50, Mar. 1958, p. 343-346.

Design charts incorporating data from the literature can be applied to pipeline studies and design of chemical reactors.

8299 Non-Newtonian Flow in Annuli. Arnold G. Fredrickson and R. Byron Bird. *Industrial and Engineering Chemistry*, v. 50, Mar. 1958, p. 347-352.

The analytical solution to the equation of motion is given for the steady flow of an incompressible non-Newtonian fluid flowing axially in a long cylindrical annulus under the influence of a pressure gradient and/or gravitational acceleration.

8300 On Heat Transfer in Laminar Boundary-Layer Flows of Liquids Having a Very Small Prandtl Number. G. W. Morgan, A. C. Pipkin, and W. H. Warner. *Journal of the Aeronautical Sciences*, v. 25, Mar. 1958, p. 173-180.

Analysis is based on the observation that, for very small Prandtl number, the viscous boundary layer is much narrower than the thermal boundary layer, so that the velocity distribution is essentially potential over most of the thermal layer.

8301 An Approximate Method of Determining Axisymmetric Inviscid Supersonic Flow Over a Solid Body and Its Wake. Sin-I Cheng. *Journal of the Aeronautical Sciences*, v. 25, Mar. 1958, p. 185-193.

8302 (French.) Display of Current Convection Caused by Diffusion. **Mise en evidence du courant de convection provoqué par la diffusion.** V. Freise. *Journal de Chimie Physique*, v. 54, nos. 11-12, Nov.-Dec. 1957, p. 879-884.

The butyl iodide-*tert*-butyl alcohol system was used to show that the flow accompanying binary diffusion is hydrodynamic, since the movement of the gravity centers causes displacement of colloidal particles in suspension towards the density gradient.

8303 Extension of the Vibrating Jet Method for Surface Tension Measurement to Jets of Non-Uniform Velocity Profiles. Robert S. Hansen, Mary E. Purchase, Terry C. Wallace, and Robert W. Woody. *Journal of Physical Chemistry*, v. 62, Feb. 1958, p. 210-214.

8304 Physical Gas Dynamics Research at the AVCO Research Laboratory. P. H. Rose. *North Atlantic Treaty Organization, AGARD Report No.* 145, July 1957, 43 pp. (TL565 Ag11r Vis.)

Shock-tube studies of thermodynamic equilibrium, hypersonic aerodynamics, emissivity and electrical conductivity of high temperature air, and magnetohydrodynamics.

8305* Heat Transfer Through the Laminar Boundary Layer on a Circular Cylinder in Axial Incompressible Flow. D. E. Bourne and D. R. Davies. *Quarterly Journal of Mechanics and Applied Mathematics*, v. 11, Feb. 1958, p. 52-66.

8306* (French.) Determining the Characteristics of the Limit Layer by Using Certain Typical Speed and Temperature Profiles. **Su une détermination des caractéristiques de la couche limite par l'utilisation de certains profils type de vitesses et de températures.** St. Săvulescu. *Revue de Mécanique Appliquée*, v. 2, no. 1, 1957, p. 39-53.

Velocity and temperature profiles derived from the flow of a viscous fluid limited by solid walls. Transformation of the boundary layer equations. Integral equations determining friction and heat transfer.

8307 On the Stability of Viscous Flow in a Curved Channel. W. H. Reid. *Royal Society, Proceedings*, v. 244, ser. A, Mar. 11, 1958, p. 186-198.

The stability of viscous flow between two concentric cylinders due to a pressure gradient acting round the cylinders is considered when the spacing between the cylinders is small compared with their radii.

8308* (English.) **The Automization of Liquids by Means of Flat Impingement.** Yasusi Tanasawa, Syozo Sasaki, and Nobuki Nagai. *Technology Reports, Tôhoku University*, v. 22, no. 1, 1957, p. 73-95.

A study of the atomizing characteristics of flat or 180° impingement nozzles. The mechanism of atomization of these nozzles is a typical filmwise atomization. A new type of nozzle with flat spray and controlled flow rate is proposed for the open chamber type Diesel engine.

See also: **8209** (gas flow and heat transfer in conductor-cooled machines).

FOOD TECHNOLOGY

8309* Nutritional Research in Atherosclerosis—A Progress Report. Theodore B. Van Itallie. *American Dietetic Association, Journal*, v. 34, Mar. 1958, p. 248-253.

8310 Effect of Gamma Radiation on Bacterial Spores That Have Undergone Germination Induced by Treatment With L-Amino Acids. B. Kan, S. A. Goldblith, and B. E. Proctor. *Food Research*, v. 23, Jan.-Feb. 1958, p. 41-50.

The radiosensitivities of the organisms are increased.

8311* Studies on Microbiological Methods for Predicting Shelf-Life of Dressed Poultry. W. L. Mallmann, L. E. Dawson, B. M. Sultzer, and H. S. Wright. *Food Technology*, v. 12, Mar. 1958, p. 122-126.

A new method for determining psychrophilic populations on dressed poultry by the use of a Phytone-Nacconol medium incubated at 20 C for 72 hrs. by either the pour or drop plate technique is presented.

8312 Determination of Endrin in Agricultural Products and Animal Tissues. J. M. Bann, et al. *Journal of Agricultural and Food Chemistry*, v. 6, Mar. 1958, p. 196-202.

A sensitive method for the colorimetric determination of endrin, with phenyl azide and diazotized sulfanilic acid as the analytical reagents, is described.

8313 A Conceptual Design of a Food Irradiation Reactor. *U. S. Atomic Energy Commission, AECU*-3361, Sept. 30, 1956, 370 pp. (UF767 U3au Contin.)

A technical report concerned with: reactor-design, cooling system, shielding; components-assembly, vessel, control system; auxiliary cooling system; nuclear considerations; internal heating; reactor-radiator efficiencies; hazards.

FUELS AND COMBUSTION

8314* (German.) The Ignition of Fuel Mixed With Air on Hot Surfaces. **Die Zündung von Brennstoff-Luft-Gemischen an heissen Oberflächen.** B. Kaesche-Krischer and H. Gg. Wagner. *Brennstoff-Chemie*, v. 39, nos. 3-4, Feb. 1958, p. 33-43.

Comparison of methods for determining "gas ignition point" and "drop ignition point", as depending upon size of container, composition of the mixture, and wall material. Formation of cold flames.

8315 A Study of the Pyrolysis of Hydrocarbons and Tar Acids in Relation to Preheated Producer Gas. D. W. Gill. *British Coal Utilisation Research Association, Monthly Bulletin*, v. 22, Jan. 1958, p. 1-18.

Study of the chemical changes in the organic constituents likely to result from preheating producer gas is regenerative furnaces such as open-hearth and glass furnaces.

8316* (French.) Importance of the Roga Index for Determination of the Coking Performance of Coal. **L'importance de l'indice Roga dans la détermination du pouvoir cokéfiant de la houille.** J. Hamaker. *Chaleur & Industrie*, v. 39, no 390, Jan. 1958, p. 3-13.

International classification of coals. Relationship between the results of the swelling test and those of the Roga test. Variation of the Roga index for a binary coal mixture, as a function of the composition. Coking power of different coals.

8317* Research in 1957. III. The Kinetics of Coal Carbonisation. *Coke and Gas*, v. 20, Feb. 1958, p. 60-64.

8318* (German.) Coking Tests Under Semitechnical Conditions. **Verkokungsversuche in halbtechnischem Massstab.** Wilhelm Reerink, Heinrich Echterhoff, and Kurt-Günther Beck. *Glückauf; Bergmännische Zeitschrift*, v. 94, nos. 3-4, Jan. 18, 1958, p. 102-110.

Effect of the heating-flue temperature and of oil and coke-dust additives on the properties of coke.

8319* (German.) Tests on the Effects of Water Content, Grain Size, and Oil Additives, on the Bulk Weight of Coking Coal. **Untersuchungen über den Einfluss von Wassergehalt, Körnung und Ölzugabe auf das Schüttgewicht der Kokskohle.** Heinrich Echterhoff. *Glückauf; Bergmännische Zeitschrift*, v. 94, nos. 3-4, Jan. 18, 1958, p. 110-121.

8320* Heat Transfer From Town Gas Flames to Water Jacketed Horizontal Tubes. S. R. Tailby and M. D. Ashton. *Institution of Chemical Engineers, Transactions*, v. 36, no. 1, 1958, p. 1-12.

Principal variable studies were primary-air to gas ratio, gas burner characteristics, excess air entrained into the system, and horizontal tube length.

8321 Determination of Oxygen Atoms in Lean, Flat, Premixed Flames by Reaction With Nitrous Oxide. C. P. Fenimore and G. W. Jones. *Journal of Physical Chemistry*, v. 62, Feb. 1958, p. 178-183.

The reaction $O + N_2O \rightarrow 2NO$ is characteristic for O atoms up to 1000 K.

8322* (Czech.) Effect of Coal Granularity on Coke Strength. **Vliv zrnitosti uhlí na pevnost koksu.** Zd. Medřický. *Paliva*, v. 38, no. 1, Jan. 1958, p. 13-14.

Results of experiments to determine the effect of fine grinding of coke mixtures on the strength of coke. Best results were achieved from the mixture predominantly of coal fraction 33.

8323* (German.) Experience With the B.I.S.R.A. Burner in Oil-Fired Open-Hearth Furnaces. **Erfahrungen mit dem BISRA-Brenner in ölgefeuerten SM-Öfen.** K. Schermer. *Radex Rundschau*, 1958, no. 1, Jan., p. 36-41.

A comparison trial of the B.I.S.R.A. burner and a burner of different design, in all-basic 100-ton open-hearth furnaces.

8324 Combustion of Liquid Hydrocarbon Fuels for Oxygen Cutting. Dieu Khuong-Huu, Sheldon S. White, and Clyde M. Adams, Jr. *Welding Journal*, v. 37, Mar. 1958, p. 101s-106s.

A generalized relationship governing the effect of dissociation on adiabatic flame temperatures is derived. This permits calculation of a realistic adiabatic flame temperature for any oxy-hydrocarbon flame. For a given fuel flow rate, the speed with which the oxy-gasoline torch can cut mild steel is inversely related to the flame oxygen flow rate (cutting oxygen flow rate being held constant).

8325* (Russian.) Temperature of the Flame of a Single Drop of Liquid Fuel. **Temperatura plameni odinochnoi kapli zhidkogo topliva.** M. A. Gurevich and V. B. Shteinberg. *Zhurnal Tekhnicheskoi Fiziki*, v. 28, no. 2, Feb. 1958, p. 394-401.

Measurements proved that the maximum temperature of the flame is much lower than that calculated from diffusion theory. This difference is not less than 500 C and could be much higher with an increase of O in the gaseous medium.

See also: **7839** (composition of cracking gases); **7895** (determination of volatiles in coal, coke, and char); **7915** (determination of mercaptans in fuels); **8025** (synthesis of hydrocarbons from CO and H); **8331** (coal research in 1957); **8887** (analysis of flame interference fringes).

GEOLOGY, GEOPHYSICS, MINERALOGY, AND MINING ENGINEERING

8326* Chief Tool of the Petroleum Exploration Geologist: The Subsurface Structural Map. Louie Sebring, Jr. *American Association of Petroleum Geologists, Bulletin*, v. 42, Mar. 1958, p. 561-587.

Preparation and use of the subsurface structural map with stratigraphic additions and modifications. Well logs provide the bulk of the basic data required and the most useful is the electric log.

8327* Photometer Method for Studying Quartz Grain Orientation. Joseph D. Martinez. *American Association of Petroleum Geologists, Bulletin*, v. 42, Mar. 1958, p. 588-608.

Method for determining the direction and relative degree of preferential quartz grain optic axis orientation in rocks principally composed of quartz is intended primarily as a tool in the petrofabric analysis of sandstones.

8328* (English.) **Determination of the Oxidation State of Uranium in Apatite and Phosphorite Deposits.** Roy S. Clarke, Jr. and Zalman S. Altschuler. *Geochimica et Cosmochimica Acta*, v. 13, nos. 2/3, 1958, p. 127-142.

8329* A Study of the Ionospheric Irregularities Which Cause Spread-*F* Echoes and Scintillations of Radio Stars. B. H. Briggs. *Journal of Atmospheric and Terrestrial Physics*, v. 12, no. 1, 1958, p. 34-45.

8330* The Effect of Fluid-Flow Rate and Viscosity on Laboratory Determinations of Oil-Water Relative Permeabilities. C. R. Sandberg, L. S. Gournay, and R. F. Sippel. *Journal of Petroleum Technology*, v. 10; *American Institute of Mining and Metallurgical Engineers, Transaction*, v. 213, Feb. 1958, p. 36-43.

Relative permeabilities were found to be solely a function of saturation and independent of flow rate, provided there was no saturated gradient induced in the core sample by "boundary effect".

8331* Coal Research in 1957. Harlan W. Nelson and Richard B. Engdahl. *Mining Congress Journal*, v. 44, Feb. 1958, p. 110 + 5 pages.

Reviews world-wide activities in developing better and more economical ways to mine, prepare, and use coal.

8332 Automation in the Mineral Industries. John McCaslin. *Mining Engineering*, v. 10, Mar. 1958, p. 337-341.

Instrumentation for measurements of temperature, pressure, strain, flow, position, and vibration.

8333 A Radar Sonde System for Upper Air Measurements. N. E. Goddard and H. A. Dell. *Philips Technical Review*, v. 19, no. 9, Feb. 1958, p. 258-263.

Apparatus measures wind speed and direction, temperature, pressure, and humidity at altitudes up to 24 km.

8334* A Review of Methods Used to Increase Oil Recovery. Robert L. Slobod. *Producers Monthly*, v. 22, Feb. 1958, p. 24-31.

8335* On the Size Distribution of Airborne Mine Dust. H. S. Sichel. *South African Institute of Mining and Metallurgy, Journal*, v. 58, Dec. 1957, p. 171-225.

Data on various dusts are presented, and the characteristics of the distribution are discussed. The "goodness-of-fit" of various previously proposed size distribution laws, when applied to these characteristics is examined. It is shown that none of them fit satisfactorily. A new size distribution law is therefore proposed.

8336* (English.) **Hydrodynamical Methods of the Short- and Long-Range Weather Forecasting in the USSR.** E. N. Blinova and I. A. Kibel. *Tellus*, v. 9, Nov. 1957, p. 447-463.

8337 Quantitative Photogeology — Popular Exploration Tool. Laurence Brundall and Vernon Jackson. *World Oil*, v. 146, Mar. 1958, p. 85-90.

Geological data obtained through quantitative photo geology are used in the preparation of structural maps, profiles, isopach maps, and in hydrodynamic studies.

8338* (Russian.) The Behavior of Natural Radioactive Isotopes. **K voprosu o povedenii estestvennykh radioaktivnykh izotopov.** V. I. Baranov, A. M. Babeshkin, and K. B. Zaborenko. *Zhurnal Neorganicheskoi Khimii*, v. 3, Jan. 1958, p. 16-19.

Analysis of movement of radioactive Ra and Th compounds by means of diffusion and various solutions.

See also: **8294** (ventilating fans for mines); **8360** (bibliography of space literature).

GRAPHIC ARTS

8339* The LTF Color Survey. Frank M. Pruecil. *American Pressman*, v. 68, no. 3, Mar. 1958, p. 8 + 6 pages.

A survey of offset color reproduction.

8340 High-Speed Photography: A Tool for the Engineer. D. P. C. Thackeray. *Engineering*, v. 185, Feb. 14, 1958, p. 214-217.

Equipment and methods.

8341 Time Exposures Record Water Current Movements. F. B. Gauthier. *Industrial Photography*, v. 7, Mar. 1958, p. 20-21.

A "salt-water" bulb that floats, lights up on hitting water, and provides illumination for an hour, is used for photo studies of water current action in hydraulic models.

8342* The Simultaneous Developing and Fixing of Photographic Emulsions. Harry S. Keelan. *Journal of Photographic Science*, v. 5, Nov.-Dec. 1957, p. 144-145.

An improved bath using Phenidone is described. Variables which must be controlled for best results.

8343 Chopping Light. D. A. Senior. *Machinery Lloyd (Overseas Ed.)*, v. 30, no. 5, Mar. 1, 1958, p. 71-77.

Principles of high-speed photography. Typical optical shutters.

8344* Running Presensitized Plates. *Offset Duplicator Review*, v. 8, no. 3, Mar. 1958, p. 15 + 3 pages.

Lithographers obtain best results with as little water, ink, and pressure as possible.

8345 Offset Lithography. Bruce E. Tory. 331 pp. 1957. Horwitz Publications Inc., Sydney, Australia. (NE2425 T63o)

A review of technical aspects of the industry starting from type composition, and proceeding through the many operations to the final lithographed sheet.

8346 Photomechanics and Printing. J. S. Mertle and Gordon L. Monsen. 423 pp. 1957. Mertle Publishing Co., Chicago. (TR925 M55p Over.)

Practical information on platemaking and presswork by recognized procedures.

8347* (German.) The Electrostatic Charge of Photographic Material in the Electron Microscope. **Die elektrostatische Aufladung des Photomaterials im Elektronenmikroskop.** E. Kinder. *Zeitschrift für Angewandie Physik*, v. 10, no. 2, Feb. 1958, p. 95-98.

Shows how blurring effects caused by too high a charge density on fine-grain films can be avoided or at least reduced.

HEAT POWER

8348 A Survey of the Radiation Stability of Hydrocarbon Fuels. J. G. Carroll, R. O. Bolt, and J. A. Bert. *Aeronautical Engineering Review*, v. 17, Mar. 1958, p. 61-66.

Small samples of a gasoline stock, kerosene, stove oil, and typical JP-3, JP-4, and JP-5 jet fuels were exposed to γ-radiation. Postirradiation tests were performed and compared with those from the original fuels.

8349* (German.) Deposits on Heating Surfaces in Steam Generators. **Heizflächenverschmutzung in Dampferzeugern. II.** Chemical Conversions in the Combustion Chamber and Measures Against Their Bad Effects. **Chemische Umsetzungen im Feuerraum und Massnahmen gegen ihre schädlichen Folgen.** Kurt Wickert. *Brennstoff-Wärme-Kraft*, v. 10, no. 3, Mar. 1958, p. 101-107.

Experimental studies of the volatility with steam of inorganic oxides and modifications of alkali salts from compounds easily volatilized, into compounds difficult to volatilize. Reactions between SO_2, O, and CaO. Cleaning of the surfaces and removal of S compounds from flue gases.

8350* (French.) Improving the Efficiency of the Superheating and Re-Superheating Cycle by Drawing Off Water From the Heaters. **Amélioration du rendement du cycle à surchauffe et à resurchauffe par des soutirages d'eau aux réchauffeurs.** J. Ricard. *Chaleur & Industrie*, 1958, no. 391, Feb., p. 27-49.

Improving the modern superheating and re-superheating cycle by drawing off a small amount of water from each heater. This water is reheated by the steam drawn off, until its temperature is close to that of the steam and then fed back either to the feed water or to a point just before the reheating unit.

8351* (Russian.) Solubility of Sodium Chloride in Overheated Water Vapor. **Rastvorimost' khloristogo natriia v vodianom peregretom pare.** Z. V. Deeva and A. A. Kot. *Elektricheskie Stantsii*, v. 29, no. 1, Jan. 1958, p. 14-16.

Solubility in a wide pressure range (from 100 to 300 atm.) and at temperatures up to 550 C.

8352* (Russian.) The Effect of Certain Factors on the Temperature Distribution in the Gas-Turbine Rotor. **Vliianie nekotorykh faktorov na raspredelenie temperatury v rotore gazovoi turbiny.** K. P. Seleznev and A. I. Taranin. *Energomashinostroenie*, v. 4, no. 1, Jan. 1958, p. 21-26.

Effects of temperature of the cooling air, conditions of heat exchange on the rotor surface, and thermal conductivity of the material are studied by the "Electromodulation" method.

8353 Gas-Turbine Regenerator Performance. P. Fortescue and D. V. Wordsworth. *Engineering*, v. 185, Feb. 28, 1958, p. 284-286.

How choice of working fluid affects regenerator size, a factor in the design of gas-turbine plants for high-temperature nuclear reactors.

8354 Radiotracer Studies of Engine Deposit Formation. Clifton N. Sechrist and Harold H. Hammen. *Industrial and Engineering Chemistry*, v. 50, Mar. 1958, p. 341-342.

8355* Analogue for High-Intensity Steady-Flow Combustion Phenomena. D. B. Spalding. *Institution of Mechanical Engineers, Proceedings*, sec. A, v. 171, no. 10, 1957, p. 383-411.

Apparatus is designed to assist in combustion-chamber development for an aircraft gas-turbine or ram-jet.

8356* (Russian.) Combustion in a Chamber Having a Variable Section. **Gorenie v kamere peremennogo secheniia.** E. Larish. *Revue de Mécanique Appliquée*, v. 2, no. 1, 1957, p. 55-60.

Study of the propagation of combustion in a gaseous combustible mixture moving in a flat or axially symmetrical chamber, having an arbitrarily changeable section. Section ratio necessary for perfect combustion.

8357 (Italian.) Propellants for Rockets. **Propellenti per razzi. I.** C. Paleari and F. Renzanigo. *Rivista dei Combustibili*, v. 11, no. 12, Dec. 1957, p. 841-873.

Thermodynamic considerations. Physical properties and heat of formation of some propellants. Monopropellants and bipropellants. Physical constants of some hydroborons. Liquid and solid propellants.

8358* (Norwegian.) Gasoline Combustion, Motor Knock, and Octane Number. **Forbrenning av bensin, motorbank og oktantall.** Kåre Mortensen. *Teknisk Ukeblad*, v. 105, no. 10, Mar. 6, 1958, p. 207-216.

Study of combustion. Different laboratory and practical methods for measuring the knocking rate in octane number. Improving this rate in the refining processes or by addition of tetraethyl lead.

8359 Summary of Scale-Model Thrust-Reverser Investigation. John H. Povolny, Fred W. Steffen, and Jack G. McArdle. *U. S. National Advisory Committee for Aeronautics, Report* 1314, 1957, 14 pp. (TL521 Un3r Vis.)

Models of three types—target, tailpipe cascade, and ring cascade were tested with unheated air. Effects of design variables on reverse-thrust performance, reversd-flow boundaries, and thrust-modulation characteristics were determined.

See also: **7709** (matching in two-spool turbo-prop engines); **7725** (optimum thrust rocket programming); **8308** (fuel atomization); **8320** (heat transfer to boiler tubes); **8386** (solar energy furnaces); **8442** (Li high-energy fuel); **8483** (alkalinity control in boiler water); **8903** (vibration damping in piston engines); **9002** (open cycle refrigeration system).

INFORMATION—PREPARATION AND DISSEMINATION

8360 A Bibliography of Space Literature. James F. Sunderman. *Air Force*, v. 41, Mar. 1958, p. 168 + 6 pages.

Lists books on missiles, rockets, satellites, astronautics, space, spaceflight, and closely related fields.

8361 The A. W. S. Bibliographies. Sections individually paged. 1957. American Welding Society, New York. (ZTS227 Am35a Ref.)

Bibliographies of papers published in the *Welding Journal* since 1937 are arranged according to subject matter.

8362* Bibliography on Adhesive Bonding of Metals. 23 pp. 1957. Engineering Societies Library, New York. (ZTS228 En33b Ref.)

A selected list of over 150 annotated references covering theory, technology, and applications of adhesive metal-to-metal bonding from 1947 to date, including references to properties, uses, and methods of application of various types of adhesives.

8363 Simplified Stoichiometric Formula Index. Herman Skolnik and Jane K. Hopkins. *Journal of Chemical Education*, v. 35, no. 3, Mar. 1958, p. 150-152.

Formula index file cites C last, eliminates H, and carries other elements in alphabetical order by symbol.

INSTRUMENTATION

8364 Autographic Stress-Strain Recorders. Raymond R. Bouche and Douglas R. Tate. *ASTM Bulletin*, 1958, no. 228, Feb., p. 33-42.

Operating principles and performance data on representative instruments.

8365 A High-Speed Tension Testing Machine. S. Strella, H. Sigler, M. Chmura, and B. Holman. *ASTM Bulletin*, 1958, no. 228, Feb., p. 50-52.

Tester will fracture a test specimen in the loading time range of 5 to 40-milliseconds, giving the stress-strain behavior of the specimen.

8366* Pneumatic Weigh Cells Improve Automatic Weighing and Blending. W. E. Milligan. *Automation*, v. 5, Mar. 1958, p. 94-96.

Characteristics of pneumatic weigh cell permit its use in variety of bulk material weighing applications.

8367 A Small Optical Tracker. Gardner H. Sloan. *Electromechanical Design*, 1958, no. 4, Mar., p. 24-27.

Three circuit techniques for radiation tracking. Optical system with a one-cubic-inch tracking head can follow an extremely weak source, such as a light spot on a C-R tube, at 5 c.p.s. within one milliradian tracking error.

8368 Strain Gages in Supersonic Aircraft. Robert J. Stewart. *Electronic Industries*, v. 17, Mar. 1958, p. 60-61.

Weldable strain gages, requiring no elevated temperature curing and providing a 13% error in sensitivity through 1200 F, appear most promising for supersonic aircraft study.

8369* Temperature Measurement With Thermistors. J. C. Anderson. *Electronic & Radio Engineer*, v. 35, Mar. 1958, p. 80-84.

Details of an industrial thermometer for 0-100 C using a Wheatstone bridge, a medical thermometer covering 85-105 F incorporating a balanced transistor amplifier, and a high sensitivity device using a two-stage transistor amplifier.

8370* Instruments for Brightness Measurements. E. K. Whitener, Jr. and George G. Maltenfort. *Fibre Containers and Paperboard Mills*, v. 43, Feb. 1958, p. 62 + 2 pages.

8371* Determination of Particle Size by Higher Order Tyndall Spectra. E. J. Meehan. *Journal of Polymer Science*, v. 27, Jan. 1958, p. 590-591.

Higher order Tyndall spectra have been used for the rapid determination of particle size in monodisperse suspension with relative refractive index (m) equal to 1.20, 1.44, and 1.55. While it is possible to calculate the angular positions of the orders from Mie theory, in practice usually it is necessary to establish an empirical calibration using suspensions of known particle size. Points out a useful approximation which renders such calibration unnecessary for size determination within 15% in the range of m from unity up to at least 1.44.

8372* Precise Evaluation of Surface Area With Indirectly Calculated Dead Space. William V. Loebenstein. *Journal of Research, National Bureau of Standards*, v. 60, Feb. 1958, p. 105-108.

The determination of surface area from N adsorption data obtained at low temperature by volumetric methods is subject to several errors. One error that becomes especially serious when the surface area is small is associated with the calibration of the dead space with He. This error is large because the volume of adsorbed gas is calculated as a small difference between two comparatively large quantities. A statistical method of successive approximations was developed for calculating the dead space.

8373 A New Bent Crystal Soft X-Ray Vacuum Spectrograph. B. Mitra and K. Das Gupta. *Journal of Scientific & Industrial Research*, v. 16, sec. B, Dec. 1957, p. 524-527.

Casette and crystal holder remain fixed in the vacuum chamber and the source is movable. Target can be fixed at different positions relative to the fixed crystal holder to obtain suitable glancing angles for different wavelengths.

8374 New Types of Recording Differential Thermobalances. P. L. Waters. *Journal of Scientific Instruments*, v. 35, Feb. 1958, p. 41-46.

Two types of thermobalances which automatically record the differential and cumulative weight losses during pyrolysis.

8375 A Linear, Unidirectional Anemometer of Rapid Response. R. J. Taylor. *Journal of Scientific Instruments*, v. 35, Feb. 1958, p. 47-52.

Based on the principle that heated wire dissipating constant power causes temperature changes in the air moving past it which vary approximately inversely as the wind speed.

8376 An Oxidizing Atmosphere Furnace for Use With an X-Ray Diffractometer. S. W. Kennedy and L. D. Calvert. *Journal of Scientific Instruments*, v. 35, Feb. 1958, p. 61-62.

A resistance furnace assembly to fit the Norelco diffractometer makes possible the investigation of rigid specimens or powders in controlled atmospheres or vacuum.

8377 A Laboratory Electron Bombardment Furnace. P. G. England and H. N. Jones. *Journal of Scientific Instruments*, v. 35, Feb. 1958, p. 66-68.

Details of a furnace in which small ingots (approximately 3 X ⅛ X ⅛-in.) of metal can be melted on a water-cooled Cu hearth under a high vacuum. The charge is heated by bombardment with a stream of electrons emitted from a W filament suspended above the charge.

8378 A Combined Liquid Nitrogen Cryostat, Furnace and Liquid Helium Bath. M. J. Stubbs and M. W. Thompson. *Journal of Scientific Instruments*, v. 35, Feb. 1958, p. 68-69.

Apparatus in which a liquid N cryostat and a furnace were associated for annealing specimens from −196 to 200 C. Provision was made for transferring the specimens to liquid He without removing them from the apparatus.

8379 Vacuum/Pressure Pump for Liquids and Suspensions. *Machinery Lloyd (Overseas Ed.)*, v. 30, Feb. 15, 1958, p. 86-87.

Comprises a vessel adapted for both vacuum and pressure and having a control device which enables it to use air (or inert gas) pressure to generate internal vacuum or pressure.

8380 Automatic Position Indicator for Use With Dynamic Balancing Machines. V. Seale-Finch. *Machinery (London)*, v. 92, Feb. 14, 1958, p. 377-378.

Device is based on the principle that when an electric discharge takes place within a liquid contained in a small cavity from which there is an outlet, some of the liquid is expelled through that outlet.

8381 Spherical Specimen Mount for Pole Figure Determination. D. S. Eppelsheimer and K. K. Tangri. *Missouri. University. School of Mines and Metallurgy, Bulletin. Technical Series No.* 86, 1957, 10 pp. (QE131 M69.85t Vis.)

Technique using Geiger counter X-ray spectrophotometer permits complete pole figure coverage with the use of only one diffraction specimen. Intensities of the reflections may be plotted directly on a stereographic net without corrections for geometry or absorption.

8382 1956 National Symposium on Vacuum Technology Transactions. Edmond S. Perry and John H. Durant, editors. 234 pp. 1956. Pergamon Press, New York. (QC166 C73v Over.)

Papers deal with the following aspects of vacuum technology: fundamental developments; methods and techniques for obtaining high vacuum; instrumentation, controls, and vacuum devices; vacuum distillation; metallurgical and chemical applications; technical subjects of current interest.

8383* Measuring Very High Temperatures. A. A. Ware. *New Scientist*, v. 3, Mar. 6, 1958, p. 30-33.

Temperatures of millions of degrees must be measured indirectly by observations on the light or the neutrons given out by the hot gas.

8384* Thermal Conductivity Apparatus for Operation Near Room Temperature. J. T. Gier, R. V. Dunkle, and J. T. Bevans. *Refrigerating Engineering*, v. 66, Mar. 1958, p. 39-42.

Construction and operation of an inexpensive device to rapidly determine thermal conductivity of solids near room temperature.

8385* (English.) **Oscillofil 16. A Galvanometer-Element Recording Oscillograph.** Alfred Kübler and Christian Sörensen. *Siemens Review*, v. 24, 1957, p. 213-218.

A portable recording oscillograph with 16 galvanometer elements for simultaneous recording of phenomena, especially those of a mechanical nature.

8386 Solar Energy Furnaces. A Review of Development in the Utilization of Solar Energy to Produce High Temperature. Guy Benveniste. 23 pp. 1955. Stanford Research Institute, Menlo Park, Calif. (TJ810 B44s Over.)

8387 Recording Thermogravimetric Balance. F. M. Teetzel, et al. *U. S. Atomic Energy Commission, NLCO*-713, Jan. 24, 1958, 19 pp. (UF767 Un3.1nL Contin.)

Instrument continuously records weight of sample in a thermogravimetric balance during gas-solid reactions. It automatically counterbalances a percentage of the weight change so that the balance deflection remains within the optical scale limits.

8388 An Autographic Strain-Gage Dilatometer for Plutonium and Its Alloys. R. O. Elliott and W. N. Miner. *U. S. Atomic Energy Commission, LA*-2175, Feb. 24, 1958, 24 pp. (UF767 U3La Contin.)

Consists of a vertical silica tube containing the specimen and a silica push tube which transmits specimen expansion to a cantilever beam. Strain gages cemented to the beam convert linear displacement of the specimen into an electrical signal that is fed to an X-Y recorder.

8389 Progress Report I. Thermocouple Research Report for the Period November 1, 1956 to October 31, 1957. David L. McElroy. *U. S. Atomic Energy Commission, ORNL*-2467, Mar. 5, 1958, 87 pp. (UF767 U3o Contin.)

Describes the first year of progress in an investigation of thermoelectric thermometry, with particular reference to Chromel-Alumel type alloys in the range 500 to 1100 C.

8390* (French.) Leak Detection by Helium Spectrometer on High Pressure Vessels. **Détection de fuites sur des récipients sous pression à l'aide d'un spectromètre à hélium.** R. Geller. *Vide*, v. 12, no. 7, Sept.-Oct. 1957, p. 398-406.

In one method the test is made with a "sniffler" (an aperture must exist on the vessel to fill it with He). The second method can be used for sealed vessels.

See also: **7801** (sedimentation particle-size analysis); **8332** (instrumentation for the mineral industries); **8335** (particle size distribution of airborne mine dust); **8347** (electron-microscope photography); **8869** (inverted-magnetron vacuum gage).

LUBRICATION AND FRICTION

8391 Trends in Ball Bearing Design for Farm Machinery. R. S. Howe, Jr. and G. H. Raley. *Agricultural Engineering*, v. 39, Mar. 1958, p. 152 + 5 pages.

Facts on lubricants, prelubrication, seals, and housed units, as supporting evidence that the grease gun will become out-moded as tomorrow's bearings develop.

8392 The State of Dispersion of Detergent Additives in Lubricating Oil and Other Hydrocarbons. J. B. Peri. *American Oil Chemists' Society, Journal*, v. 35, Mar. 1958, p. 110-117.

Ultracentrifugation and viscosity data indicate that the sulfonate type of detergents normally exists in hydrocarbon solvents as small micelles approximately two molecular lengths in diameter, ranging in shape from nearly spherical to rodlike. The micellar size, in the case of calcium petroleum sulfonate, changes with concentration and temperature.

8393 No Grease, No Bearing Failure. *Chemical and Engineering News*, v. 36, Mar. 3, 1958, p. 90.

Operation of bearings in a reducing atmosphere of air and JP-4 jet fuel raises temperature limits to near 1000 F.

8394 Wear of Metals. F. T. Barwell. *Institute of Metals, Journal*, v. 86, pt. 6, Feb. 1958, p. 257-269.

Significant factors are: speed and load, geometry, lubricant, surface roughness, nature of oxide films, metallurgical structure, presence of abrasive matter, and corrosive environment. The mechanism of wear, pitting arising from rolling contact, scuffing arising from sliding contact, fretting corrosion due to vibratory motion, and the effect of oxygen on friction and surface damage during simple sliding are discussed.

8395* Principles and Applications of Hydrodynamic-Type Gas Bearings. G. W. K. Ford, D. M. Harris, and D. Pantall. *Institution of Mechanical Engineers, Proceedings*, v. 171, no. 2, 1957, p. 93-128 + 4 plates.

8396* Proper Lubrication Means Better Performance. R. L. Slater. *Instrumentation*, v. 11, no. 1, Jan.-Feb. 1958, p. 9-11.

Use the correct diaphragm control valve lubricant for the specific application to assure increased efficiency plus adequate preventive maintenance.

8397 Take Care of Oil Seals for Longer Bearing Life. E. W. Fisher. *Iron Age*, v. 181, no. 11, Mar. 13, 1958, p. 110-111.

Suggestions for seal maintenance.

8398 Wear Resistance. Is Melting Point the Key? H. A. Unckel. *Iron Age*, v. 181, no. 12, Mar. 20, 1958, p. 97-100.

Sandblasting, abrasion with emory, and sliding contact were used to study the wear behavior of seven common metals. Data supports the theory that wear is roughly proportional to the inverse of the absolute melting point of the metal.

8399* Grease Flow in Shielded Bearings. R. O'Halloran, J. J. Kolfenbach, and H. L. Leland. *Lubrication Engineering*, v. 14, no. 3, Mar. 1958, p. 104 + 4 pages.

A dye tracer technique for measuring soap and oil components of a grease in shielded bearing lubrication.

8400* Analysis of Equilibrium Operating Temperatures of Railroad Journal Bearings. W. M. Keller and G. L. Pigman. *Lubrication Engineering*, v. 14, no. 3, Mar. 1958, p. 108-115.

Graphical method of analysis utilizes existing laboratory data to describe friction characteristics of the railroad bearing.

8401 Molybdenum Disulfide Does It. *Power Engineering*, v. 62, Mar. 1958, p. 60-62.

Composition, properties, and applications of the various MoS_2 lubricants available. Preparation of surfaces for MoS_2 coatings. Oxidation products.

8402* (German.) The Electronic Reproduction of Mechanical Friction. **Die elektronische Nachbildung mechanischer Reibung.** E. Bühler. *Regelungstechnik*, v. 6, no. 1, 1958, p. 14-19.

Attempt to reproduce the manifestations of the general laws of friction with the aid of electrical switching appliances.

8403 Proposed Method of Test for Measurement of Extreme Pressure Properties of Lubricants. *ASTM Bulletin*, 1958, no. 228, Feb., p. 28-32.

Procedure for determining the load-carrying capacity of lubricating oils and lubricating greases by means of the Timken Extreme Pressure Tester.

8404* (German.) The Effect of Additions on the Friction Resistance of Sintered Copper. **Über den Einfluss von Zusätzen auf das Reibverhalten von Sinterkupfer.** Wilhelm Hofmann and Gerhard Pieper. *Zeitschrift für Metallkunde*, v. 49, no. 2, Feb. 1958, p. 80-86.

The friction and wear of sintered Cu is investigated as a function of alloying additions. A special machine with radial attachment of the specimen permits comparison of noise, friction, and wear.

See also: **8427** (elastic and damping properties of oil-film journal bearings); **8457** (Al bearing alloy); **8605** (stresses in bearing ring); **8638** (bearing alloys for high-temperature use); **8659** (evaluation of Cu alloy rolling oils); **8721** (score resistance of Al-Si-Cd bearings).

MECHANICAL ENGINEERING

8405* On Damped Free Vibration With Particular Reference to Systems Having Nearly-Equal Natural Frequencies. R. E. D. Bishop and D. C. Johnson. *Aeronautical Quarterly*, v. 9, Feb. 1958, p. 71-95.

Mathematical analysis.

8406* (German.) Permissible Loadings of Aluminum Compression Members. **Tragspannungen von Drukbiegestäben aus Aluminium.** J. Weinhold. *Aluminium (Dusseldorf)*, v. 34, no. 3, Mar. 1958, p. 143-151.

The permissible stresses in single-unit Al compression members of constant cross-section were calculated for specified eccentricities of load application through introduction of a parallel deformation line and reduced dimensionless variables, independent of the material.

8407* Basic Pneumatics for Automation. II. Controlling One Double-Acting Cylinder. H. L. Stewart and J. M. Moritz. *Automation*, v. 5, Mar. 1958, p. 78-81.

Methods of selective deceleration of piston motion and arrangements for oscillation of machine elements.

8408 The Influence on the Stress Distribution in an Adhesive Lap Joint of Bending of the Adhering Sheets. A. S. McLaren and I. MacInnes. *British Journal of Applied Physics*, v. 9, Feb. 1958, p. 72-77.

Introduction of a bending moment in the sheets opposite to that occurring in the conventional joint can produce a stress distribution on the glue line free from high normal stresses and fairly uniform in shear. A modified design of lap joint to insure this is proposed.

8409 Centrifugal and Axial Flow Pumps. A. J. Stepanoff. 2nd Ed. 462 pp. 1957. John Wiley & Sons, New York. (TJ919 S43c2)

Theory, design, and application.

8410 CRSI Design Handbook. R. C. Reese. 2nd Ed. 447 pp. 1957. Concrete Reinforcing Steel Institute, Chicago. (TA683 C74c2)

Finished designs of reinforced concrete members, giving concrete sizes and reinforcement. Safe load tables. Design methods. ASTM specifications.

8411* Stresses in a Cylindrical Pressure Vessel on a Cylindrical Support. Raymond Hicks. *Engineer*, v. 205, Feb. 21, 1958, p. 274-277.

Stresses are induced in a cylindrical pressure vessel by the constraint of a cylindrical support. General expressions are obtained here for the stresses arising in the structure under external loading and when experiencing an axial temperature gradient.

8412* Laterally Loaded Plates. Moment Distribution Around a Small Circular Hole. Raymond Hicks. *Engineer*, v. 205, Mar. 7, 1958, p. 350-355.

A general expression was obtained for the deflection surface of a variably perforated plate when the deflection surface of a similarly loaded plate with no hole is known.

8413 Heat Transfer. Max Jakob. v. II. 652 pp. 1957. John Wiley & Sons, New York. (QC320 J21h)

Heat radiation in spaces of simple configuration. Selected fields of heat transfer applications.

8414* The Riding Qualities of Wheeled Vehicles. H. L. Cox. *Institution of Mechanical Engineers, Automobile Division, Proceedings*, 1955-56, no. 10, p. 265-278.

Vibration is analyzed into heaving, pitching, and rolling modes, and means are described to compute or simulate the response of the vehicle both to continuous excitation at definite frequencies, and to isolated obstacles affecting one wheel at a time.

8415 Velocity and Acceleration Analysis of Plane and Space Mechanisms by Means of Independent-Position Equations. Francis H. Raven. *Journal of Applied Mechanics*, v. 25, no. 1, Mar. 1958, p. 1-6.

A generalized analytical method for the determination of velocities and accelerations in mechanisms having motion in either two or three dimensions.

8416 A Blade-Vibration-Damping Device—Its Testing and a Preliminary Theory of Its Operation. R. A. Di Taranto. *Journal of Applied Mechanics*, v. 25, no. 1, Mar. 1958, p. 21-27.

8417 Bending Frequency of a Rotating Cantilever Beam. M. J. Schilhansl. *Journal of Applied Mechanics*, v. 25, no. 1, Mar. 1958, p. 28-30.

The stiffening effect of the centrifugal forces on the first-mode bending frequency of a rotating cantilever beam of uniform cross section is investigated by means of a method of successive approximations.

8418 Bending of an Elastically Restrained Circular Plate Under Normal Loading Over a Sector. W. A. Bassali and R. H. Dawoud. *Journal of Applied Mechanics*, v. 25, no. 1, Mar. 1958, p. 37-46.

The complex variable method is used to find the deflection, bending and twisting moments, and shearing forces at any point of a thin circular plate normally loaded over a sector and supported at its edge under a general boundary condition including the usual clamped and simply supported boundaries.

8419 Natural Frequencies of Nonuniform Beams on Multiple Elastic Supports. R. A. Di Taranto. *Journal of Applied Mechanics*, v. 25, no. 1, Mar. 1958, p. 57-63.

Frequencies are determined for the cases of two supports with varied end conditions and three supports with a torsional and linear restraint at each support.

8420 Creep Deflections and Stresses of Beam-Columns. T. H. Lin. *Journal of Applied Mechanics*, v. 25, no. 1, Mar. 1958, p. 75-78.

8421 Carrying Capacity of an Elastic-Plastic Cylindrical Shell With Linear Strain-Hardening. P. G. Hodge, Jr. and S. V. Nardo. *Journal of Applied Mechanics*, v. 25, no. 1, Mar. 1958, p. 79-85.

The approximate capacity of a thin-walled closed shell, simply supported at each end and subjected to a uniform hydrostatic pressure is determined. Elastic and plastic strains are considered.

8422 Thermal Stresses in Transversely Isotropic Semi-Infinite Elastic Solids. Brahmadev Sharma. *Journal of Applied Mechanics*, v. 25, no. 1, Mar. 1958, p. 86-88.

Mathematical analysis.

8423 The Bursting Pressure of Cylindrical and Spherical Vessels. N. L. Svensson. *Journal of Applied Mechanics*, v. 25, no. 1, Mar. 1958, p. 89-96.

The relationship between pressure and change of dimensions for cylindrical and spherical vessels subjected to internal pressure is considered for a material having a given stress-strain curve.

8424 Axial - Temperature - Gradient Bending Stresses in Tubes. F. G. Hammitt. *Journal of Applied Mechanics*, v. 25, no. 1, Mar. 1958, p. 109-114.

Study of the bending stresses induced in a thin-walled tube adjacent to a joint between the tube and a heavier section by an axial temperature gradient imposed across the assembly.

8425 Torsion and Flexure of Slender Solid Sections. W. J. Carter. *Journal of Applied Mechanics*, v. 25, no. 1, Mar. 1958, p. 115-121.

8426 Stress Distribution Around a Circular Inclusion in a Semi-Infinite Elastic Plate. E. M. Saleme. *Journal of Applied Mechanics*, v. 25, no. 1, Mar. 1958, p. 129-135.

An exact two-dimensional solution in series form.

8427 Elastic and Damping Properties of Oil-Film Journal Bearings for Application to Unbalance Vibration Calculations. A. C. Hagg and G. O. Sankey. *Journal of Applied Mechanics*, v. 25, no. 1, Mar. 1958, p. 141-143.

8428 Three-Dimensional Photoelasticity. M. M. Leven and A. M. Wahl. *Machine Design*, v. 30, Mar. 6, 1958, p. 150-154.

Three-dimensional photoelastic tests on complicated structures yield results which are directly applicable to machine design. Techniques, equipment, and materials required for these results by the frozen-stress method are described.

8429 Catalog of Equivalent Mechanisms for Cams. Harold A. Rothbart. *Machine Design*, v. 30, Mar. 20, 1958, p. 175-180.

A catalog of 13 equivalent linkage systems for simplified analysis of complex cam-follower motions.

8430 Merit Indices for Structural Materials. H. B. Howard. *North Atlantic Treaty Organization, AGARD Report No.* 195, Apr. 1957, 24 pp. (TL565 Ag11r Vis.)

Merit indices are derived to give weight efficiency for a number of simple structural properties, including direct strength and stiffness, buckling of Euler and of plate struts, wrinkling of thin-walled tubes, thermal stress, and deformation. The indices are applied to typical Al and Ti alloys and to a stainless steel between room temperature and 400 C.

8431* (Russian.) Equilibrium of Flexible Plates Beyond the Elastic Limit. **O ravnovesii gibkikh plastinok za predelom uprugosti.** Iu. R. Lepik. *Prikladnaia Matematika i Mekhanika*, v. 21, no. 6, Nov.-Dec. 1957, p. 833-842.

Formulas were derived for determination of certain auxiliary values. Two problems were solved concerning the equilibrium of round plates.

8432* (French.) Periodic Motion of Rotors With a Non-Linear Characteristic of the Bearing Support. **Le mouvement périodique des rotors avec une caractéristique non-linéaire des appuis de roulement.** Aleš Tondl. *Revue de Mécanique Appliquée*, v. 2, no. 1, 1957, p. 129-144.

Unfavorable effect of the non-linear characteristic on the support in the area where the rotation velocity is double the critical rotation velocity.

8433* (German.) A New Method for Study of the Theory of Mechanisms and Machines. **Eine neue methode zum studium der theorie der mechanismen und maschinen.** D. Mangeron, C. Drăgan, and Vl. Svijevschi. *Revue de Mécanique Appliquée*, v. 2, no. 1, 1957, p. 145-156.

Problem of the distribution of accelerations of first and second order. Comparison of different classifications of mechanisms; graphic analysis of spatial mechanisms.

8434* (German.) Formulas for the Buckling of Bars With Linearly Variable Longitudinal Forces. **Formeln für das Knicken von Stäben mit linear veränderlicher Längskraft.** F. Reinitzhuber. *Technische Mitteilungen Krupp*, v. 15, no. 8, Dec. 1957, p. 226-230.

Application of new approximation formulas results in more accurate computations and better design.

8435* (Russian.) The Effect of Fluid Temperature on Cavitation Properties of the Centrifugal Pump. **O vliianii temperatury zhidkosti na kavitatsionnye kharakteristiki tsentrobezhnogo nasosa.** M. A. Peshkin. *Teploenergetika*, v. 5, no. 2, Feb. 1958, p. 47-51.

8436 Instability Phenomena in Thin-Walled Cylinders. W. R. Russ and F. Forscher. *U. S. Atomic Energy Commission, WAPD-161*, Dec. 17, 1956, 61 pp. (UF767 Un3.1wa Contin.)

A general discussion and analysis of the mechanical instability in thin-walled cylinders subjected to combined stresses. Two instability conditions are postulated, one arising from a maximum in the internal pressure, the other resulting from a maximum in the circumferential (hoop) load.

8437* (German.) Dynamic Stresses in the Motors of a Fleet of Automobiles. **Die dynamischen Beanspruchungen in Kraftfahrzeugtriebwerken.** Heinz Glaubitz. *VDI Zeitschrift*, v. 100, no. 5, Feb. 11, 1958, p. 173-183.

The motors of a 1928 car, a small truck, two trucks of 3.5 and 7 t. respectively, and a 5 t. street-car were studied. Measurements of the moment of rotation and stresses in the motors, according to their intensity and frequency.

8438* (English.) **Disturbance Produced in an Elastic Half-Space by an Impusive Twisting Moment Applied to an Attached Rigid Circular Disc.** M. Mitra. *Zeitschrift für Angewandte Mathematik und Mechanik*, v. 38, nos. 1-2, Jan.-Feb., 1958, p. 40-43.

See also: **8466** (corrosion in pumps); **8544** (design of die castings); **8555** (design of castings); **8567** (design of Al castings); **8642** (minimum bend radii of Al alloy tubes); **8991** (wave propagation in rubber).

METALLURGY

8439 Are Tool Steels the Answer to High-Speed Flight? Joseph H. Mainhardt and John P. Wright. *American Machinist*, v. 102, Mar. 10, 1958, p. 106-110.

Design data centering on the formability, machinability, decarburization control, and heat treatment of hot-work tool steel in both sheet and bar form.

8440 High Temperatures Spur Use of Nickel-Base Alloys. II. T. E. Kihlgren. *Aviation Age*, v. 28, no. 9, Mar. 1958, p. 130 + 5 pages.

Properties, heat treatment, fabrication, welding, and brazing of Inconel alloys.

8441* (Russian.) Structural Steel, Alloyed With Boron. **Konstruktsionnaia stal', legirovannaia boron.** A. M. Tarasov. *Avtomobil'naia Promyshlennost'*, 1958, no. 1, Jan., p. 17-19.

Comparison of technological and strength properties of boron steel with 35XMA steel, in production of automobile parts.

8442* A New Look at Lithium Metal. Marshall Sittig. *British Chemical Engineering*, v. 3, Mar. 1958, p. 130-133.

Physical properties; alloys; use in liquid-metal-heat transfer systems, polymerization catalysis, and high-energy fuels.

8443* New Steel for Aircraft and Missiles. *British Steelmaker*, v. 24, Mar. 1958, p. 77-79.

Armco PH 15-7 Mo is a new precipitation hardening stainless steel claimed to have outstanding properties, including good corrosion resistance and a remarkable combination of mechanical properties at both room and elevated temperatures. Behavior suggested its use where creep is a factor.

8444 Compilation of Chemical Compositions and Rupture Strengths of Super-Strength Alloys. Ward F. Simmons and V. N. Krivobok, compilers. 6 pp. 1957. American Society for Testing Materials, Philadelphia. (TA490 Si47c Over.)

This compilation lists the name, nominal chemical composition, characteristic rupture strengths for rupture in 100 and 1000 hr., and patentee for approximately 150 domestic and 75 foreign alloys. It includes the ferritic (martensitic) alloys and age-hardening stainless steels, but not the conventional austenitic stainless steels.

8445 Technical Survey. *Copper Development Association, Technical Survey No.* 11, Jan. 1958, 38 pp. (TN780 C79t Contin.)

Surveys technical progress in Cu and Cu alloys, covering production, foundry practice, fabrication, plating, finishing, properties, applications, corrosion, joining, powder metallurgy, physical metallurgy, inspection, testing, and analysis.

8446* (Czech.) Development of the Manufacture of High Quality Seamless Tubes for Petroleum Industry and Geological Research. **Vývoj výroby bezešvých trubek vyšších jakostních stupňů pro těžbu nafty a geologický průzkum.** Osvald Pejčoch and Josef Červený. *Hutnické Listy*, v. 13, no. 1, Jan. 1958, p. 2-9.

Development of production technology for manufacturing high quality tubes. Chemical composition of the steel and its production in open-hearth furnace.

8447* (Czech.) Production and Application of Silicon-Aluminum. **Výroba a používání siliko-aluminia.** Vladimír Keclik. *Hutník*, v. 8, no. 2, Feb. 1958, p. 54-55.

Principles of SiAl production and chemical composition of necessary raw materials. In comparison with pure Al+FeSi, application of SiAl alloy has many technological and economic advantages.

8448 Survey Hot-Work Tool Steels for Aircraft and Missiles. II. R. J. Nekervis, C. H. Lund, and A. M. Hall. *Iron Age*, v. 181, Mar. 6, 1958, p. 120-121.

A rundown of the actual experience of users in the production, welding, and machining of hot-work tool steels.

8449 Vacuum Metallurgy. A. E. Williams. *Metal Industry*, v. 91, Sept. 20, 1957, p. 233-237.

Describes equipment and methods for degassing, distillation, vacuum metallizing, and powder metallurgy.

8450 Aluminium and Its Alloys in 1957. Some Aspects of Research and Technical Progress Reported. E. Elliott. *Metallurgia*, v. 57, no. 340, Feb. 1958, p. 79-92.

Progress in the metallurgy of Al and its alloys, viz. extraction, founding, fabrication, constitution, properties, and standardization. Cites novel applications.

8451* The Production and Properties of Super-Purity Aluminium. T. G. Pearson and H. W. L. Phillips. *Metallurgical Reviews*, v. 2, no. 8, 1957, p. 305-360 + 1 plate.

Electrolytic refining by the three-layer process; methods of analysis for certain minor impurities; physical metallurgy; properties of zone-refined super-purity Al; fabrication; joining.

8452* (French.) Boron Steels. Present State of Development. **Les aciers au bore etat actuel de la question.** A. Clerc *Métaux, Corrosion-Industries*, v. 32, no. 387, Nov. 1957, p. 409-435.

Improvements in the production and analysis of B steels. Use of B in structural, weldable, and heat resistant steels. Mechanism of the effect of B on hardenability. Distribution of B in the α and γ phases.

8453 Minutes of Titanium Symposium on Heat Treating and Alloying. 63 pp. 1956. Metallurgical Advisory Committee on Titanium, Watertown, Mass. (TN799.T5 M56th)

Abstracts and discussions of the papers presented.

8454* Roundup of Ductile Iron Technology. David Matter. *Modern Castings*, v. 33, Mar. 1958, p. 24-27.

Ductile iron offers high strength, ductility, and wear resistance, without sacrificing the process advantages of cast iron-low melting point, good fluidity, and excellent castability.

8455* (German.) Operating Tests Undertaken to Produce Copper Free From Oxygen, and Their Results. **Betriebsversuche und deren Ergebnisse zur Herstellung von sauerstofffreiem Kupfer.** Hans Eckstein. *Neue Hütte*, v. 3, no. 1, Jan. 1958, p. 32-36.

Tests connected with the production of a Cu used in the power-tube industry, with a maximum of 0.0003% oxygen, a specific weight of 8.9 for the cast material, and at least 58 m/Ω mm² for the conductivity of the soft annealed material.

8456* Zirconium and Its Alloys. C. Tyzack. *Nuclear Engineering*, v. 3, no. 24, Mar. 1958, p. 102-114 + 4 plates.

A summary of metallurgical, physical, chemical, and nuclear data together with a brief discussion on the effects of irradiation on the properties of Zr, and applications of the metal outside the nuclear industry.

8457 A New High Strength Aluminum Bearing Alloy. *Precision Metal Molding*, v. 16, Mar. 1958, p. 82.

Alcoa alloy X-385 is a new die casting alloy for parts that require good bearing characteristics coupled with high tensile, compression, and fatigue properties. Composition is a typical Al-Si-Cu die casting alloy with small amounts of Sn, Pb, and Cd added.

8458 The Application of Precoated Steel Sheets in Industry. II. E. Marks. *Sheet Metal Industries*, v. 35, Mar. 1958, p. 195-201.

Production and use of tinned, terne-, lead-, and phosphate-coated, blue-planished, aluminized, and plastic-coated sheets.

8459* The Role of Metallurgy in Atomic Energy Technology. I. A. Blainey. *South African Institute of Mining and Metallurgy, Journal*, v. 58, Dec. 1957, p. 226-255.

Nuclear principles; physical aspects of nuclear fuels and reactors; metallurgical behavior of nuclear fuels, cladding materials, and metallic coolants in a reactor.

8460 Preparation of Nuclear Poison and Control Alloys. Zirconium-Boron Alloys. A. P. Beard, J. W. Harrison, and W. B. Clark. *U. S. Atomic Energy Commission, KAPL-1555*, July 18, 1957, 30 pp. (UF767 Un3.1ka Contin.)

Zirconium base-boron alloys with nominal compositions of 0.2 to 3.0 wt% B were arc-melted and fabricated by hot extrusion and rolling. Chemical analyses of as-cast ingots, extruded rods, and rolled strip indicated high B recovery and good homogeneity. Brinnel hardness numbers were directly proportional and measured densities were inversely proportional to B content.

8461 The Application of a Nominal 48 Wt % U-Al Alloy to Plate-Type Aluminum Research Reactor Fuel Elements. W. C. Thurber, J. H. Erwin, and R. J. Beaver. *U. S. Atomic Energy Commission, ORNL-2351*, Mar. 11, 1958, 34 pp. (UF767 U3o Contin.)

Increasing U concentration from 18 to 48 wt.% resulted in increased segregation, higher strength, and loss of ductility. Nonuniform deformation during roll bonding into composite plates caused localized thinning of the cladding. A fuel element, containing 48 wt.% U-Al alloy, was irradiated in the MTR to an estimated burnup of 25% of the U-235 atoms with no observable damage.

8462* (German.) Possibility of Applying Mathematical Statistics to Metallurgy. **Anwendungsmöglichkeit der Mathematischen Statistik im Metallhüttenwesen.** Rolf Wartmann. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 11, no. 2, Feb. 1958, p. 63-69.

Danger of average values. Importance of the distribution factor. Quality control based on both. In sampling, the total distribution is made of the errors of the individual division levels. Calculation of the influence factor.

METALS—CORROSION

8463* (Russian.) The Relationship Between the Structure of Some Magnesium Alloys and Their Tendency to Corrosion Under Stress. **Sviaz' mezhdu strukturoi magnievogo splava i ego sklonnost'iu k korrozü pod napriazheniem.** M. A. Timonova. *Akademiia Nauk SSSR, Doklady*, v. 117, no. 5, Oct. 11, 1957, p. 848-851.

The main element which causes corrosion cracking of Mg-Al-Zn-Mn alloys is Al, when more than 2 to 3% is present.

8464* (German.) The Temperature Dependence of Scaling of Pure Iron in Oxygen. **Die Temperaturabhängigkeit der Verzunderung von reinem Eisen in Sauerstoff.** Norbert G. Schmahl, Hans Baumann, and Hermann Schenck. *Archiv für das Eisenhüttenwesen*, v. 29, no. 2, Feb. 1958, p. 83-88.

To avoid supertemperatures, a "hoop-drop" regulator was used in measurements of scaling of electrolytic iron at 480 to 1080 C in O at atmospheric pressure.

8465* (German.) Material and Corrosion Problems in a Reactor With Liquid Metals as Coolants. **Werkstoff- und Korrosionsprobleme im Reaktor mit flüssigen Metallen als Kühlmittel.** Willibald Machu. *Atomkernenergie*, 1958, no. 3, Mar., p. 97-100.

Using liquid metals as cooling agents offers advantages and also creates problems: selective corrosion, mass transfer, and welding phenomena. Behavior of different materials in melted Na and K. (To be continued.)

8466 Right Material Cuts Pump Corrosion. F. R. Drahos. *Chemical Engineering*, v. 65, Mar. 1958, p. 162 + 2 pages.

Types of corrosion in centrifugal pumps. Selection of optimum pump construction materials.

8467 Corrosion Meter Slashes Time for Corrosion-Rate Determinations. Theodore W. Wett. *Chemical Processing*, v. 21, Mar. 1958, p. 172-173.

Circuit is so constructed that ratio of resistance of corroding element to that of non-corroding element is translated directly into micro-inches or mils of metal lost.

8468 The Use of Magnesium for the External Cathodic Protection of Marine Vessels. C. F. Schrieber. *Corrosion*, v. 14, Mar. 1958, p. 26-30.

Five-year studies indicate effective protection by a distributed system of Mg anodes.

8469* The Copper Sulfate Electrode. Gordon N. Scott. *Corrosion*, v. 14, Mar. 1958, p. 36-40.

Calculation of electrode potential from thermodynamic data. Simple tests to evaluate effects of temperature, polarization, contamination, acidification, and dry-earth contacts. Tests of direct burial electrodes.

8470 Prevention of Localized Corrosion in Sulfuric Acid Handling Equipment. G. A. Nelson. *Corrosion*, v. 14, Mar. 1958, p. 45-49.

Corrosion is due to differences in carbide structure created during welding or hot riveting operations. Possible mitigative measures are to remove the objectionable zones by a normalizing heat treatment, prevent objectionable phases from forming, or cover the areas with other corrosion resistant materials.

8471 Some Considerations in the Design and Application of an Electrical Resistance Corrosion Meter. G. A. Marsh and E. Schaschl. *Corrosion*, v. 14, Mar. 1958, p. 55-58.

8472 Stress Corrosion of Austenitic Stainless Steel in Geothermal Steam. T. Marshall. *Corrosion*, v. 14, Mar. 1958, p. 59-62.

Tests were conducted in geothermal steam contaminated with chlorides, H_2S, CO_2, etc., in air-free steam superheated at 150 C, and steam superheated and aerated at 150 C.

8473* (French.) Some New Data on the Protection of Magnesium Based Alloys. **Quelques idées nouvelles sur la protection des alliages à base de magnésium.** W. F. Higgins. *Corrosion et Anticorrosion*, v. 6, no. 2, Feb. 1958, p. 40-43.

Importance of protection for Mg parts. Anodic treatment: correct drawing, surface purification and passivation, sealing, correct assembling, and final coating.

8474* (French.) Chemical Protection Against Oxidation, of Aluminum and Its Alloys Before Coating. **Traitement chimique de protection contre l'oxydation, ou avant peinture, sur l'aluminium et ses alliages.** Claude Hess. *Corrosion et Anticorrosion*, v. 6, no. 2, Feb. 1958, p. 44-47.

Causes for the increasing use of Al and Al alloys. Types of alloys having a high mechanical or corrosion resistance. Electrochemical and chemical surface treatments. Exposure tests.

8475* (French.) Rapid Corrosion Testing of Electrolytic, Chemically Passivated, Zinc Coatings on Steel. **Essais de corrosion accélérés de revêtements électrolytiques de zinc sur acier, passivés par la méthode chimique.** Tadeusz Biestek. *Corrosion et Anticorrosion*, v. 6, no. 2, Feb. 1958, p. 59-65.

Critical study of rapid corrosion tests on steel plates in artificial industrial environments, hot water, saline solutions, moist atmospheres, or natural surroundings.

8476* (French.) Surface-Activity Phenomena and Chemical Anticorrosion Treatments for the Protection of Materials. **Les phénomènes de tensio-activité et les traitements chimiques de protection des matériaux contre la corrosion.** R. Tortel. *Corrosion et Anticorrosion*, v. 6, no. 2, Feb. 1958, p. 66-68.

Technical and economical advantages of the use of surface-active agents.

8477* (French.) Corrosion Testing Methods. **Méthodes d'essais de corrosion.** W. Wiederholt. *Corrosion et Anticorrosion*, v. 6, no. 3, Mar. 1958, p. 80-100.

Exposure to dampness at constant temperature, or varying between 20 and 40 C, or in a SO_2 or CO_2 atmosphere; exposure to saline atmosphere; alternating immersion. Sheets of steel and Zn with different coatings were used.

8478* (French.) Study of Intercrystalline Corrosion by Means of Hydrochloric Acid in High-Purity Aluminum and in Aluminum Purified by the Zone Melting Technique. **Etude de la corrosion intercristalline par l'acide chlorhydrique de l'aluminium de trés haute pureté et de l'aluminium purifié par zone fondue.** F. Montariol. *Corrosion et Anticorrosion*, v. 6, no. 3, Mar. 1958, p. 101-106.

Effect of metal purity on the preferential corrosion of the grain boundaries of very pure Al in HCl. Corrosion is slower with very pure metal. Certain additions to the reagent accelerate the process.

8479* A New Technique for Measuring the Rate at Which a Solid Surface Is Attacked by a Corrosive Gas. *Corrosion Prevention and Control*, v. 5, Feb. 1958, p. 51-52.

Procedure employs time-lapse photography of the reacting solid so that a permanent record of the reaction's progress is obtained at specified time intervals.

8480 A Reaction Rate Study of the Corrosion of Low-Hafnium Zirconium in Aqueous Hydrofluoric Acid Solutions. Tennyson Smith and George Richard Hill. *Electrochemical Society, Journal*, v. 105, Mar. 1958, p. 117-121.

Rate of dissolution of Zr in aqueous HF solutions was studied over a temperature range of 7-78 C using Zr-95 radioactive tracer.

8481 Dissolution of Metals in Aqueous Acid Solutions. II. Depolarized Dissolution of Mild Steel. A. C. Makrides and N. Hackerman. *Electrochemical Society, Journal*, v. 105, Mar. 1958, p. 156-162.

Dissolution rates of mild steel cylinders rotated in 2*N* HCl solutions containing $FeCl_3$, benzoquinone, and tolu-*p*-quinone.

8482* (Russian.) Effect of Ammonia on the Corrosion of Brass Condenser Tubes. **O korrozii latunnykh kondensatornykh trubok pod deistviem ammiaka.** L. D. Berman and D. Ia. Kagan. *Elektricheskie Stantsii*, v. 29, no. 1, Jan. 1958, p. 19-23.

Industrial experience shows the great possibility of corrosion of condenser-air cooler tubes by NH_3, even at its low initial concentrations in steam. Some suggestions for prevention of NH_3 corrosion.

8483* (Russian.) The Problem of the Alkaline Attack of Boiler Water. **K voprosu o shchelochnoi agressivnosti kotlovoi vody.** I. F. Shapkin. *Energeticheskii Biulleten'*, 1958, no. 2, Feb., p. 24-27.

Discusses reduction of the alkalinity of boiler water.

8484* (German.) Investigation of the Behavior of Aluminum in Contact With Common Organic Solvents. **Untersuchungen über das Verhalten von Aluminium gegenüber gebräuchlichen organischen Lösungmitteln.** K. Broockmann. *Fette, Seifen, Anstrichmittel*, v. 59, no. 12, Dec. 1957, p. 1078-1084.

Strong aggressive behavior of anhydrous, boiling *n*-alcohols and glycol monoalkyl ether against Al. Methyl glycol attacks pure Al at 60 C and very pure Al is attacked at 40 C. Control by water or ketone additions.

8485* (Russian.) Investigation of the High Temperature Oxidation of Some Iron Tungsten Alloys. **Issledovanie vysokotemperaturnogo okisleniia nekotorykh splavov zheleza s vol'framom.** Iu. D. Kozmanov. *Fizika Metallov i Metallovedenie*, v. 5, no. 1, 1957, p. 74-81.

Iron-tungsten alloy (up to 60% W) contains, besides Fe oxides, WO_3, FeW_4, and $FeWO_6$ phases. The best heat resisting properties of the alloy are in the range from 700 to 800 C.

8486* Corrosion Measurement by Resistance Method. D. M. McCloud. *Gas*, v. 34, Mar. 1958, p. 126 + 3 pages.

The Corrosometer method for measuring corrosion involves installing a special probe in the system under study, and following the progress of corrosion on the probe electrically by means of a special meter.

8487* (German.) Corrosion Protection of Long-Distance Supply System of Ruhrgas A. G. **Korrosionsschutz im Fernleitungsnetz der Ruhrgas AG.** Walter von Baeckmann. *Gas- und Wasserfach*, v. 99, Ausgabe Gas, no. 7, Feb. 1958, p. 153-162.

8488* (German.) Alternate Immersion Tests on Cast Iron and Steel Plates With Regard to Corrosion in Open Pit Mines. **Wechseltauchversuche an Gusseisen- und Stahlplatten im Hinblick auf die Korrosion in Tagesschächten.** Werner Sardemann. *Glückauf; Bergmännische Zeitschrift*, v. 94, nos. 9/10, Mar. 1, 1958, p. 338-345.

Unprotected cast iron plates were more resistant to tap water and brine than steel plates.

8489 Effect of *p*H on Corrosion Potential. I. A. Ammar and S. Riad. *Journal of Physical Chemistry*, v. 62, Feb. 1958, p. 150-154.

The dependence of the potential of a corroding metal on the *p*H of solution was studied by considering the recent aspects of the kinetics of H evolution and metal dissolution, and expressions for the corrosion potential were deduced under the condition when the reverse rates for the cathodic and anodic reactions can be neglected.

8490* (Russian.) Electrochemical and Corrosion Behavior of Iron in Aqueous Electrolyte Solutions. **K voprosu ob elektrokhimicheskom i korrozionnom povedenii zheleza v vodnykh rastvorakh elektrolitov. III.** Electrode Potential and the Rate of Iron Corrosion in Acid Electroyte Solutions. **Elektrodnyi potentsial i skorost' korrozii zheleza v kislykh rastvorakh elektrolitov.** B. A. Purin' and L. K. Lepin' *Latvijas PSR Zinātnu Akademijas, Vēstis*, 1957, no. 12, p. 141-150.

The following electrolytes with the different values of pH were used: HCl, HCl + NaCl, HCl + $CaCl_2$, and H_2SO_4 + K_2SO_4.

8491* (German.) Corrosion of Aluminum by Water at Higher Temperatures. **Der Angriff von Wasser auf Aluminium bei höheren Temperaturen.** P. LeLong and J. Hérenguel. *Metall*, v. 12, no. 3, Mar. 1958, p. 176-179.

Mechanisms of uniform attack, intercrystalline corrosion, and spot-shaped attack were studied.

8492* (German.) Causes of the Rapid Formation of Very Thick Films of Rust on Cast Iron. **Über die Ursachen rascher Flugrostbildung bei Gusseisen.** G. Schikorr. *Metalloberfläche*, v. 12, no. 3, Mar. 1958, p. 81-84.

Effects of chlorides and atmospheric moisture. Progressive formation of rust up to 300μ thick. Penetration of chlorine ions and lamellar graphite into the structure. Sources of chlorides causing the corrosion.

8493* (Italian.) On the Corrosion of Metals at High Temperature by Vanadium Anhydride. **Sulla corrosione dei metalli ad alta temperatura da parte dell'anidride vanadica.** Aurelio Burdese and Sergio Gallo. *Metallurgia Italiana*, v. 50, no. 1, Jan. 1958, p. 8-14.

Systematic examination of the behavior of Cr, Ni, and Co alloys as a function of their Ti contents.

8494* (French.) Determining the Thickness and Constitution of Oxide Films on Tin and Tin Plate. **Détermination de l'épaisseur et constitution des films d'oxyde sur l'étain et le ferblanc.** S. C. Britton and K. Bright. *Métaux. Corrosion Industries*, v. 32, no. 387, Nov. 1957, p. 436-442.

Measurements of reducible O and of cathodic reduction. Separation of metal films. Identification of films formed in air or by passivation treatment.

8495* (French.) Particular Aspects of Corrosion in Atomic Plants. **Quelques aspects particuliers de la corrosion dans les installations d'énergie atomique.** Corrosion by Liquid. **La corrosion par les métaux liquides.** Léo F. Epstèin. Remarks on the Corrosion of U in Liquid Na. **Observations sur la corrosion de l'uranium dans le sodium liquide.** H. Mogard. Corrosion Problems Involved by the Bi-U Fuels. **Problèmes de corrosion posés par les combustibles bismuth-uranium.** J. R. Weeks, et al. *Métaux. Corrosion-Industries*, v. 32, no. 388, Dec. 1957, p. 490-493.

8496* Reaction Kinetics of Zirconium and Zircaloy-2 in Dry Air at Elevated Temperatures. L. F. Kendall, R. G. Wheeler, and S. H. Bush. *Nuclear Science and Engineering*, v. 3, Feb. 1958, p. 171-185.

Corrosion rates Co were measured at 500, 600, and 700 C. Initially the rate decreases with exposure time, approximating a cubic relationship; after which the rate becomes linear.

8497 Cathodic Protection May Boost Corrosion. C. Breckon. *Petroleum Refiner*, v. 37, Mar. 1958, p. 189-190.

For non-ferrous alloys, service results show that cathodic protection could be detrimental to exchanger tubes. The protection prevents formation of a natural film on the tube and subjects it to impingement attack.

8498 (German.) Corrosion of Metallic Materials and Metallic Protective Coatings in Industrial Atmospheres. **Die Korrosion metallischer Werkstoffe und metallischer Schutzüberzüge in Industrieluft.** Gerhard Schikorr. *Schweizer Archiv für Angewandte Wissenschaft und Technik*, v. 24, no. 2, Feb. 1958, p. 33-46.

Description of the air composition in different industrial areas; oxygen, H, and SO_2 contents. Formation of a protective layer in the case of some nonferrous metals. Behavior of Fe and its alloys.

8499 A Basic Study of Corrosion of Magnesium. Richard R. Addiss, et al. *U. S. Air Force. Wright Air Development Center. WADC Technical Report* 57-576, Dec. 1957, 52 pp. (TL507 Un3.18w Vis.)

Preliminary results on the patterns obtained from pure Mg in a field emission microscope. Studies of oxidation at low temperatures.

8500 The Corrosion of Type 347 Stainless Steel in Boiling Digest Liquors. Frederick W. Fink, Walter J. Braun, and Oliver M. Stewart. *U. S. Atomic Energy Commission, BMI-1252*, Jan. 28, 1958, 39 pp. (UF767 U3b Contin.)

Additions of Al to the digest liquors will reduce attack in both the liquid and vapor phases when relatively high concentrations of fluoride are involved. Iron additions may be used to some extent to combat corrosion arising from high chloride levels. Type 304 ELC stainless steel appears to have comparable corrosion resistance to Type 347 and Carpenter No. 20 stainless.

8501* (Russian.) Resistance of Electrolytic Deposits of Chromium to Cavitation Destruction. **Soprotivliaemost elektrolitícheskikh osadkov khroma kavitatsionnomu razrusheniiu.** M. G. Timerbulatov and V. E. Khromov. *Vestnik Mashinostroeniia*, v. 38, no. 2, Feb. 1958, p. 56-58.

Relation between the conditions of electrolysis and cavitation erosion, especially between resistance and hardness of the precipitate.

8502* (German.) Mechanism of Passivity, Especially in the "Flade" Stress Corrosion of Iron. **Zur Deutung der Passivität, insbesondere der Flade-Bezungsspannung des Eisens.** H. Göhr and E. Lange. *Zeitschrift für Elektrochemie*, v. 61, no. 10, 1957, p. 1291-1301.

Behavior of active iron and its transition into the passive state. Interpretation of the reduced speed of corrosion of passive iron and its independence of the Fe^{+3} concentration.

8503* (German.) Passivation and the Formation of Protective Coatings by Contact With Water. **Passivierung und Schutzschichtenbildung in aufbereiteten Wässern.** Luigi Piatti. *Zeitschrift für Metallkunde*, v. 49, no. 1, Jan. 1958, p. 42-47.

Under favorable conditions a natural limestone-oxide film forms on ferrous metals. Sometimes phosphates, silicates, or chromates are added to the water. Sodium-nitrate favors the formation of oxide films on the metal surface. Organic inhibitors are likewise effective.

8504* (German.) Investigations of the Stress Corrosion of Alpha-Brass in Ammonia Vapor. **Untersuchungen über die Spannungskorrosion von Alpha-Messing in Ammoniakdampf. III.** Ammonia Method for Testing Brass Items for Tension Crack Resistance. **Eine Ammoniakmethode zur Prüfung von Messinggegenständen auf Spannungsrissempfindlichkeit.** Franz Aebi. *Zeitschrift für Metallkunde*, v. 49, no. 2, Feb. 1958, p. 63-68.

The usual Hg test for a stressed brass specimen is discussed on the basis of modern theory. A new method produces equilibrium NH_3 atmospheres by controlling the pH level of the solution.

8505* (Russian.) On the Mechanism of Corrosion of Metals in Narrow Slits. **Mekhanizm korrozii metallov v uzkikh zazorakh. IV.** The Corrosion of Stainless Steel. **Korroziia nerzhaveiushchikh stalei.** I. K. Marshakov and I. L. Rozenfeld. *Zhurnal Fizicheskoi Khimii*, v. 32, no. 1, Jan. 1958, p. 66-72.

The corrosion and electrochemical behavior in narrow cracks and crevices in 0.5 *N* NaCl solutions of X28, X17, 2X13, and NL steels with 3% Cr and low carbon steel. The corrosion of the stainless steel in the crevice in contrast with that in the bulk of the electrolyte increases greatly owing to the formation of active-passive cells, the anode of which is the metal in the crevice.

8506* (Russian.) A Study of the Oxidation of Metals Under the Conditions of Glow Discharge in Oxygen. **Issledovanie okisleniia metallov v usloviiakh tleiushchego razriada v kislorode.** R. I. Nazarova. *Zhurnal Fizicheskoi Khimii*, v. 32, no. 1, Jan. 1958, p. 79-86 + 1 plate.

A kinetic study of the oxidation of Cu, Al, Fe, Mg, and Zn serving as electrodes in the O glow discharge circuit, by a gravimetric (quartz beam microbalance) and a volumetric method.

8507* (Russian.) Corrosion of Steel With Hydrochloric Acid Which is in Sphere-Shape Conditions. **Korroziia stalei solianoi kislotoi v sferoidalnom sostoianii.** Kh. L. Tsetlin and S. M. Babitskaia. *Zhurnal Prikladnoi Khimii*, v. 31, no. 1, Jan. 1958, p. 84-89.

Studying the condition when drops of acid (spheroids) are separated from the surface of the metal by the heat-insulating layer of vapor-gas mixture of HCl-H_2O. Relation between the temperature of the steel and thickness of the heat-insulating layer.

See also: **8137** (oxidation of iron); **8142** (protective value of phosphate coatings); **8755** (Tm-170 radiation for thickness measurements).

METALS—EXTRACTION AND REFINING

8508* (German.) Refining of Aluminum Melts. **Das Raffinieren von Aluminiumschmelzen.** H. Riedelbauch. *Aluminium (Dusseldorf)*, v. 34, no. 3, Mar. 1958, p. 130-134.

Troubles occurring during Al remelting. Survey of refining methods and tests for estimating the efficacy of these treatments. Chlorine and nitrogen refining as especially effective. Theory and methods of grain refining.

8509 Sodium-Reduction Route Yields Titanium. *Chemical Engineering*, v. 65, Mar. 10, 1958, p. 124-127.

Process flowsheet illustrates commercial production of Ti sponge via Na reduction of $TiCl_4$.

8510 More Tantalum and Niobium on Way. *Chemical and Engineering News*, v. 36, Mar. 10, 1958, p. 24-25.

New Fansteel plant Muskogee, Oklahoma; firm's Ta output to go up 50%, Nb 150%. Key operation in the Ta and Nb extraction is separating the two metals by fractional crystallization of their fluoride salts. Main improvement at Muskogee is increased mechanization and instrumentation, resulting in higher efficiency and less manpower.

8511 Iron and Phosphate Slag From Byproduct Ferrophosphorus. J. M. Potts, W. C. Scott, Jr., J. U. Campbell, and J. A. Wilbanks. *Electrochemical Society, Journal*, v. 105, Mar. 1958, p. 148-151.

A process and furnace were developed for converting by-product ferrophosphorus into high-grade iron for metallurgical purposes and phosphatic slag that might be used as a fertilizer or animal-feed supplement. Process consists in continuously smelting ferrophosphorus with calcined, siliceous iron ore and burnt lime in an electric furnace.

8512* (Czech.) Effect of Oxygen on the Quality of Rimmed Steel Ingots. **Vliv kysliku na jakost neuklidněných ingotů.** Irma Procházková. *Hutník*, v. 8, no. 2, Feb. 1958, p. 51-53.

Characteristics of rimmed steel. Influence of FeO content, speed of pouring, and shape of molds on solidification, structure, and quality of steel ingots. Control of FeO during pouring.

8513* (Czech.) Improvement of Production Economy and Quality of Py 76 Cu Alloy. **Zhospodárnění výroby a zvýšení jakosti slitiny Py 76 Cu.** Ladislav Romaniak. *Hutník*, v. 8, no. 2, Feb. 1958, p. 59-62.

Production of soft magnetic Mu-metal semiproducts using light scrap in the charge. Purifying the bath with O. Composition and magnetic properties of 25 melts.

8514* (Russian.) Electrolytic Desulfurization of Cast Iron. **Elektrolitícheskoe obesserivanie chuguna.** O. A. Esin, I. L. Korkiia, and V. V. Mikhailov. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, 1957, no. 12, Dec., p. 71-76.

High S liquid cast iron was studied from 1480 to 1500 C with usual and high-Mg synthetic blast furnace slags. Shows the order of the cathode processes; dissolving of S, reduction of Cr, and finally, reduction of Si.

8515* (French.) Large Modern Arc Furnaces Used in Iron Metallurgy. **Les grands fours a ares modernes utilisés en sidérurgie.** M. Petitdidier. *Journal du Four Électrique*, v. 63, no. 1, Jan.-Feb. 1958, p. 19-26.

Increase of the steel production with electric arc furnaces. Design characteristics. Advantages and disadvantages compared with the open-hearth furnace.

8516 Consumable-Electrode Vacuum Arc Melting. Helmut Gruber. *Journal of Metals*, v. 10, Mar. 1958, p. 193-198.

Technology of vacuum melting; furnace design; loading and unloading; advantages of the stinger rod; arc control; vacuum pumps; safety considerations; outlook for further development.

8517* (Italian.) Recovery of Cadmium Metal From Zinc Smelter By-Products, by Means of Amalgam Metallurgy. **Produzione di cadmio elettrolitico da ricuperi di fonderia zinco per mezzo della metallurgia delle amalgame.** G. Binetti and A. Vaschetti. *Metallurgia Italiana*, v. 50, no. 1, Jan. 1958, p. 1-7.

Study of a process consisting of leaching with H_2SO_4, treating the leaching liquor with Zn amalgam, recovery of a Cd amalgam, and electrolysis with over 99.95% pure Cd deposition.

8518 (German.) The Effect of Electro-Inductive Agitation of the Bath on Metallurgical Reactions in the Electric Arc Furnace. **Die Wirkung einer elektroinduktiven Badbewegung auf die metallurgischen Reaktionen im Lichtbogenofen.** Karl Georg Speith, Hans vom Ende, and Wolfgang Schneider-Mile. *Stahl und Eisen*, v. 78, no. 4, Feb. 20, 1958, p. 215-220.

Effect of the agitating coil on reactions during refining. The iron content in the slag, O content of the steel bath, and extent of defulfurization during refining, with or without the agitating coil operating.

8519 (German.) The Decarburization Reaction in the Basic Steel Converter During Dephosphorization. **Die Entkohlungsreaktion beim Thomasverfahren während der Entphosphorung.** Heinz Pottgiesser, Jr. *Stahl und Eisen*, v. 78, no. 5, Mar. 6, 1958, p. 291-298.

Calculation of the C contents to be expected theoretically after the transition. Reciprocal adjustment of C and O when blowing with air, O-enriched air, and with mixtures of O and CO_2.

8520* (Russian.) The Quality of Steel Smelted From Pig Iron, Using the Uniform Moisture Content Blast. **Kachestvo stali iz chuguna, vyplavlennogo na dut'e postoiannoi vlazhnosti.** M. I. Kolosov, et al. *Stal'*, v. 18, no. 1, Jan. 1958, p. 24-27.

Use of moisture-containing blast does not affect unfavorably the H content in high-quality steel, its flake-sensitivity, mechanical properties, or macrostructure. Method permits increasing of blast temperatures from 450-550 C to 750-800 C, maintaining constant temperature, and controlling furnace heating by alteration of moisture content. The productivity of the furnace increases 1.3 to 3.0%, and coke consumption decreases 1.3 to 6.5%.

8521* (Russian.) Melting of Steel for Tube Production From a Low-Manganese Iron by the Scrap Process With Various Manganese Additions. **Vyplavka trubnoi stali skrap-protsessom na malomargantsovistom chugune pri razlichnykh rezhimakh margantsa.** A. I. Pastukhov, K. M. Petrov, and A. M. Danilov. *Stal'*, v. 18, no. 1, Jan. 1958, p. 28-34.

Investigation of the effect of Mn additions and residual concentration of Mn in production of high-grade steels using the scrap process. Results confirm the expediency of stopping ferromanganese additions and maintaining a regulated Mn content during melting.

8522* (Russian.) Melting of Ball-Bearing Steel in an Acid Open-Hearth Furnace Heated With Natural Gas and Fuel Oil. **Vyplavka sharikopodshipnikovoi stali v kisloi pechi pri otoplenii prirodnym gazom i mazutom.** A. A. Kiselev, M. P. Lapshova, and M. N. Kul'kova. *Stal'*, v. 18, no. 1, Jan. 1958, p. 35-40.

Use of natural gas with fuel oil added results in reduction in contamination with non-metallic inclusions and a decrease in melting time by 35 min. and hot repair time by 0.59%.

8523* (Russian.) Intensification of the Oxidizing Period in Electric Melting of Structural Steel. **Intensifikatsiia okislitel'nogo perioda elektroplavki konstruktsionnoi stali.** F. P. Edneral and N. F. Khlystov. *Stal'*, v. 18, no. 1, Jan. 1958, p. 43-48.

Oxygen injection at the end of the melting period, with addition of 3% of lime into the charge for sufficiently full dephosphorization, as well as for intensification of decarbonization, reduces the oxidizing period by 30%.

8524 Electron Beam Purifies Alloys. *Steel*, v. 142, Mar. 24, 1958, p. 108-109.

Melting and casting with a beam of electrons may cut cost of special metals and stimulate use. There is no apparent size limitation on the bar or ingot.

8525* (Russian.) Organization of the Technical Control of Blast Furnace Assembly and Welding. **Organizatsiia tekhnicheskogo kontrolia montazhnoi sborki i svarki konstruktsii domennykh pechei.** N. E. Gorozhaninov. *Stroitel'naia Promyshlennost'*, v. 35, no. 12, Dec. 1957, p. 26-29.

Practical suggestions are given.

8526* (English.) **The Effect of Si, Cr and Mn on the Equilibrium of Carbon and Oxygen in Molten Iron Saturated With Carbon. II.** Siro Ban-ya and Sachio Matoba. *Technology Reports, Tôhoku University*, v. 22, no. 1, 1957, p. 97-108.

8527* (English.) **Activity of Nitrogen in Liquid Pure Iron.** Yutaka Kasamatu and Sachio Matoba. *Technology Reports, Tôhoku University*, v. 22, no. 1, 1957, p. 109-119.

A study of the equilibrium of liquid pure iron and the controlled atmosphere of N_2-Ar mixture or N_2 only in N pressures up to 2.3 atm., between 1566 and 1740 C.

8528 Calculated Equilibrium Constants for Metal-Oxygen Reactions in Molten Uranium Alloys. E. H. Roland. *U. S. Atomic Energy Commission, WAPD-TM-99*, Nov. 1957, 15 pp. (UF767 Un3.1wb Contin.)

Gives qualitative information on the relative ability of various elements to deoxidize U, and the relative stability of the oxides formed as a result of deoxidation.

8529* (German.) Cases of Reaction Equilibrium Between Melted Lead and Metallic Oxides. **Reaktionsgleichgewichte zwischen flüssigem Blei und Metalloxyden. I.** Erich Pelzel. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 11, no. 2, Feb. 1958, p. 56-63.

A study of the equilibrium of Pb-Sb-O and Pb-As-O reactions. Equivalent material transformation. Oxidation of melted alloys.

See also: **7923** (thermoelectric determination of carbon in steel); **8190** (automatic open-hearth furnace control); **8231** (Zr by $ZrCl_4$ reduction and by electrolysis); **8238** (electrolytic separation of Zr and Hf); **8323** (B.I.S.R.A. burner in oil-fired open-hearth furnace); **8703** (solidification of steel ingots).

METALS—FINISHING, POLISHING, AND CLEANING

8530* (Italian.) Actual Problems Concerning the Surface Treatments of Aluminum. **Problemi attuali sui trattamenti superficiali dell'alluminio.** F. Sacchi. *Alluminio*, v. 27, no. 2, Feb. 1958, p. 63-71.

Structure of anodic films; sealing process; polishing, pickling, and finishing of castings; architectural colorations; vitreous enameling.

8531* (Czech.) Surface Cleaning of Aluminum. **Čištění povrchu hliníku.** Josef Roneš. *Hutník*, v. 8, no. 1, Jan. 1958, p. 20-22.

Contamination of Al surfaces and proper methods of degreasing in solvents and alkaline solutions. Importance of degreasing before pickling in surface treatment of Al and its alloys.

8532* Plating Test Determines Degree of Cleanliness of Wire Surfaces. Merton Allen. *Insulation*, v. 4, Mar. 1958, p. 10-11.

Wire is plated with Cu or Ni at low currents. Only clean areas of the surface accept the plating.

8533* (Dutch.) Preliminary Investigation of the Blast Cleaning of Steel Structures. **Vooronderzoek straalreiniging van staalconstructies.** J. H. Zaat. *Metalen*, v. 13, no. 4, Feb. 28, 1958, p. 62-70.

Study of blast cleaning materials in relation to grain size, hardness, air pressure, transport, and time; microscopic examination of the blast-cleaned surfaces.

8534 Spray Cleaning, Pickling and Phosphating. Study of Operating Conditions. A. J. Steiger. *Metal Finishing*, v. 56, Mar. 1958, p. 48-51.

Summarizes Russian research on jet-spray methods suitable for gearing metal treating operations into more highly automated production lines.

8535* (German.) Relationship Between the Surface of Metallic Materials and the Behavior of Structural Parts. **Die Oberfläche von metallischen Werkstoffen in ihrem Einfluss auf das Betriebsverhalten der Konstruktionsteile. I.** H. Wiegand. *Metalloberfläche*, v. 12, no. 2, Feb. 1958, p. 33-37.

8536* Pickling, Descaling, and Derusting of Steels. W. Bullough. *Metallurgical Reviews*, v. 2, no. 8, 1957, p. 391-406.

8537 How to Grind and Polish Stainless Steel. *Metalworking*, v. 14, Mar. 1958, p. 18-21.

Standard mill finishes; abrasives; wheels; stainless steel welds; how to grind welds; satin finishes; polishing; buffing; tips for better finishing.

8537a Finishing Die Castings. II. Polishing and Buffing. P. R. Kalischer. *Precision Metal Molding*, v. 16, Mar. 1958, p. 59 + 4 pages.

(To be continued.)

8538* Production Buffing With Liquid Compositions. H. L. Kellner. *Products Finishing*, v. 10, Nov. 1957, p. 56-62.

Liquid buffing composition improvements have enabled a number of grades to be marketed. The compositions are stable emulsions. (To be continued.)

8539* (Russian.) Floors for Galvanizing and Pickling Rooms of a Machinery Manufacturing Plant. **Poly v pomeshcheniiakh gal'vanicheskikh i travil'nykh otdelenii mashinostroitel'nykh predpriiatii.** K. N. Zhukovskii. *Stroitel'naia Promyshlennost'*, v. 35, no. 12, Dec. 1957, p. 40-42.

Recommended materials and construction methods.

See also: **8137** (pretreatment of enameling iron); **8239** (Ni plating pretreatments); **8684** (descaling mild steel rods).

METALS—FOUNDRY PRACTICE

8540* (German.) The Effect of Small Amounts of Foreign Elements in Casting Aluminum. **Der Einfluss geringer metallischer Beimengungen im Aluminiumguss.** R. Irmann. *Aluminium (Dusseldorf)*, v. 34, no. 3, Mar. 1958, p. 128-130.

Effects of Na, P, Ca, Be, Ti and B.

8541* A Modern Foundry for the Manufacture of Small Steel Castings by New Moulding Techniques. J. H. Osborn, T. A. Marsden, and R. F. Horton. *British Foundryman*, v. 51, pt. 2, Feb. 1958, p. 64-76.

Layout, construction, and operation of a foundry for producing alloy-, Mn-, and carbon-steel castings by shell-mold, Osborn-Shaw, and CO_2 block-mold processes.

8542* The Intermediate Metal Thermocouple in Metal/Mould Interface Temperature Measurements. D. V. Atterton and D. H. Houseman. *British Foundryman*, v. 51, pt. 2, Feb. 1958, p. 77-82.

Tests on steel castings show that molten metal exists at the metal/mold interface for substantial periods of time with maximum temperatures some 20-50 C above the liquidus temperature.

8543* Some Expansion Phenomena Associated With the Freezing of Non-Ferrous Alloys. W. B. Hendry and S. N. Wrightson. *British Foundryman*, v. 51, pt. 2, Feb. 1958, p. 82-90.

Expansion is controlled by mold hardness and bears a direct relationship to the size of the final shrinkage cavity. Degree of expansion is affected by the nature of the alloy, and appears to be closely linked to its gas content and/or to the partial pressure accruing from its composition.

8544 Design of Die Castings. Gustav Lieby. (Translated from the German.) 199 pp. 1957. American Foundrymen's Society, Des Plaines, Ill. (TS239 L62gtr)

Casting methods and processing principles; fundamental features of die-cast products; die-casting materials and their application; suggestion for die design and construction; dies; obtainable precision; determination of tolerances.

8545* (French.) Some Nickel - Copper - Chromium Cast Metals. Properties and Uses. **Quelques fontes au nickel-cuivre-chrome. Caractéristiques et emplois.** Guy Hénon. *Fonderie*, 1958, no. 144, Jan., p. 3-18.

Methods of economizing on Ni in castings while preserving the characteristics for which it is necessary. Effects of substituting Mn or Cu.

8546* (French.) Calculating the Feeding Sections of Pieces Cast in Sand Molds. **Détermination des sections de l'alimentation de pièces coulées en sable. II.** Charles Trenckle. *Fonderie*, 1958, no. 144, Jan., p. 25-37.

Determining the velocity factors in the different casting methods. Study of the pressure in the feeding systems. Three applications.

8547* (French.) The Use of Spheroidal Cast Iron in the Pressure Molding of Zinc and Aluminum Alloys. **Note sur l'emploi de la fonte sphéroidale dans le moulage sous pression des alliages de zinc et d'aluminium.** Luciano Oltrasi. *Fonderie*, 1958, no. 145, Feb., p. 75-78.

Spheroidal cast iron was used to make crucibles for Al and Zn treatment in electric resistance furnaces, goosenecks, and mold stands.

8548* (French.) Oxygen in the Cupola Furnace. **L'oxygène au cubilot.** François Danis. *Fonderie*, 1958, no. 145, Feb., p. 79-86.

Addition of O in the proportion of 2.5 to 3% of the blast results in lower Si loss, better castability, and a 25% increase in production.

8549* (German.) The Development of Internal Stresses Leading to Cracks in Gray Iron Castings. **Spannungsrisse und ihre Ursachen bei Gusseisen.** H. T. Angus and W. G. Tonks. *Giesserei*, v. 45, no. 4, Feb. 13, 1958, p. 81-86.

Development of internal stresses. Different rates of cooling in castings of uniform thickness. Effect of chemical composition of the metal, microstructure, and conditions of manufacture. Industrial experience with castings of varying and uniform wall thickness.

8550* (German.) The Development of Thick-Walled Steel Castings Having High Mechanical Properties. **Zur Entwicklung des Stahlgusses grosser Wanddicken für hohe festigkeitsbeanspruchungen.** Hans Bühler. *Giesserei*, v. 45, no. 4, Feb. 13, 1958, p. 87-92.

Development of new types of steel for castings having a wall thickness of 600 mm. Composition of new low C-Cr steels. Mechanical properties, in particular notch toughness and impact strength. Heat-treating methods.

8551* (German.) Construction and Operation of Modern Hot-Blast Cupola Plants. **Bau und Betrieb moderner Heisswind-Kupolofenanlagen.** Siegfried Tunder and Adam Esser. *Giesserei*, v. 45, no. 4, Feb. 13, 1958, p. 92-96.

Development of the hot-blast cupola. Methods of removing the top gas. Radiation recuperator. Methods of heating the blast by the sensible heat of the top gas and alternatively by the sensible heat together with the combustion of the CO content of the top gas. The basic hot-blast cupola. Metallurgical considerations. The basic hot-blast cupola as a remelting furnace.

8552* (German.) Preparing Nodular Cast Iron by Blowing a Mixture of CaC_2 and Mg Into the Melt. **Untersuchungen zur Herstellung von Kugelgraphitguss durch Einblasen eines Gemisches von Kalziumkarbid und Magnesium in die Schmelze.** Hans Abrecht and Kurt Giesen. *Giesserei*, v. 45, no. 5, Feb. 27, 1958, p. 113-117.

Injecting a powdered mixture of CaC_2 and Mg into a cast iron through an immersed graphite tube with a flow of N under 1.5 atm. pressure. A purifying effect was observed.

8553* (German.) Oil-Firing of Melting Furnaces for Copper Alloys With Regard to the Effect of Sulfur. **Ölbeheizung von Schmelzöfen für Kupferlegierungen unter Berücksichtigung des Schwefeleinflusses.** Paul Buttkereit. *Giesserei*, v. 45, no. 6, Mar. 13, 1958, p. 139-141.

Sulfur content of fuel oils. Reactions of the metal bath with S containing waste gases. Shrinkage piping due to SO_2. Sulfur test by means of the Baumann print. Effect of S on mechanical properties.

8554 (Swedish.) "Inverse Greyness" in Malleable Iron. **Kantgrått i aducerjärn.** Gustaf Östberg and Carl-Ewert Gustafsson. *Gjuteriet*, v. 48, no. 1, Jan. 1958, p. 8-11.

Possible causes of the occurrence of a gray surface rim in white iron castings were investigated. By means of temperature measurements with thermocouples in horizontally cast cylinders it was shown that the cooling rate in the critical temperature range just above the eutectic is lower in the surface zone than in the interior. This effect is believed to offer an explanation for the occurrence of "inverse grayness".

8555 (Swedish.) Suggestion Concerning the Design of Castings. **Konstruktionsanvisningar för gjutgods. III.** Design of Castings With Regard to Cores. **Gjutgodsets utformning med hänsyn till kärnor.** Alrik Östberg. *Gjuteriet*, v. 48, no. 2, Feb. 1958, p. 19-24.

Cavities should be designed to facilitate making and insertion of the cores. Sufficient openings for core prints are needed. The cores ought to be robust and pointed parts that may give blows in the castings should be avoided.

8556 (Swedish.) Wholly Rammed Cupola Linings. **Helstampade kupolugnsfoder.** Folke Sandford. *Gjuteriet*, v. 48, no. 2, Feb. 1958, p. 25-27.

Cupola was in intermittent use for 8-10 days with no relining or repair. The ganister should have a low moisture content and the linings dried carefully in order to avoid cracks. The ganister consumption was 20-25 kgs. per ton of melted iron.

8557* (Czech.) Cupolas With Preheated Blast. **Kuplovny s předehřátým větrem.** Stanislav Hájek. *Hutník*, v. 8, no. 2, Feb. 1958, p. 55-59.

Development of various types of cupolas with hot blast; their design, operation, thermal efficiency, and economics.

8558 An Instrument for Measuring the Gas Content of Aluminium Alloys During Melting and Casting. C. E. Ransley, D. E. J. Talbot, and H. C. Barlow. *Institute of Metals, Journal*, v. 86, Jan. 1958, p. 212-219.

8559 Stainless Castings With Unusual Hot Strength. Carl Tylka. *Materials in Design Engineering*, v. 47, Mar. 1958, p. 104-105.

Close control over solidification yields cast valves and fittings with strengths 20% higher than required by code for unfired pressure vessels.

8560* Risering of Gray Iron Castings. J. F. Wallace and E. B. Evans. *Modern Castings*, v. 33, Mar. 1958, p. 39-45.

A critical review of the technical literature. A recommended risering procedure is advanced based on available data and some original concepts and calculations.

8561* Correlation of Green Strength, Dry Strength and Mold Hardness of Molding Sands. R. .W Heine, E. H. King, and J. S. Schumacher. *Modern Castings*, v. 33, Mar. 1958, p. 49-58.

8562* Deoxidation Practice for Copper Shell - Molded Castings. R. C. Harris. *Modern Castings*, v. 33, Mar. 1958, p. 59-63.

Lithium and Ti are effective deoxidizers. Both gas-fired and H.F. (20,000 c.p.s.) induction-melting equipment are satisfactory for melting pure Cu.

8563* Fundamental Studies on Effects of Solution Treatment, Iron Content, and Chilling of Sand Cast Aluminum-Copper Alloy. E. M. Passmore, M. C. Flemings, and H. F. Taylor. *Modern Castings*, v. 33, Mar. 1958, p. 86-93.

8564* Improvement of Castings by Press Forging. A. H. Murphy, L. L. Clark, and W. Rostoker. *Modern Castings*, v. 33, Mar. 1958, p. 95-102.

Significant increases in the proof, yield, and ultimate strengths of cast and heat-treated alloys can be achieved by cold or warm deformations of the order of 15-30%. Two high-strength Al casting alloys and one Mg alloy were studied.

8565* (German.) Use, Manufacture and Heat Treatment of Alloyed Cast Steel Rolls. **Verwendung, Herstellung und Wärmebehandlung legierter Stahlgusswalzen. II.** Materials, Use and Casting of Cast Steel Rolls as Well as the Different Heat Treatment Processes. **Werkstoffe, Verwendung und Abgiessen von Stahlgusswalzen sowie die verschiedenen Arten der Wärmebehandlung.** Heinz Uhlitzsch and Gerhard Radomski. *Neue Hütte*, v. 3, no. 1, Jan. 1958, p. 10-20.

Molds and chill casting. Casting temperature and time; fire cracks; strain cracks.

8566 Casting Ferrous Metals in Anodized Molds. Lester D. LaMotte. *Precision Metal Molding*, v. 16, Mar. 1958, p. 46-48.

The Parlanti mold is anodized cast Al, designed to give an ideal rate of heat transfer so that the mold surfaces are not destroyed by over-heating and the casting has the best internal structure.

8567 Designing for Aluminum Permanent Mold Casting. I. Alloy Selection. P. R. Kalischer. *Precision Metal Molding*, v. 16, Mar. 1958, p. 51-53.

Charts show physical and mechanical properties, compositions, and heat treatment data for Al permanent mold alloys.

8568* (Czech.) Effect of Melting Process on the Quality of Malleable Iron. **Vliv tavicího pochodu v kuplovně na jakost temperaované litiny.** Břetislav Sochor. *Slévárenství*, v. 6, no. 1; *Práce Československého Výzkumu Slévárenského*, v. 5, no. 1, Jan. 1958, p. 1-8.

Effect of slag composition on the quality of acid cupola cast iron intended for malleabilization. Small additions of soda and boric compositions increase slag fluidity and facilitate the melting process. Soda additions enhance mechanical properties of the iron, while boric compositions depress them.

8569* (Czech.) Effect of Additional Treatment of Liquid Metal on the Mechanical Properties of Malleable Cast Iron. **Vliv dodatečné úpravy tekutého kovu na mechanické vlastnosti ferritické temperované litiny.** Ivan Pavlík. *Slévárenství*, v. 6, no. 1; *Práce Československého Výzkumu Slévárenského*, v. 5, no. 2, Jan. 1958, p. 9-14.

Investigations of the effect of inoculation with Al, B, and mixture of alloys FeTi, FeSiCa, and of vibrating carried out in a ladle.

8570* (Czech.) Investigation of Casting Technique for Malleable Cast Iron. **Výzkum lití techniky temperované litiny.** Miroslav Bednářík. *Slévárenství*, v. 6, no. 2; *Prace Československého Výzkumu Slévárenského*, v. 5, no. 3, Feb. 1958, p. 15-22.

Determination of volume shrinkage coefficient of material up to solidification, and the degree of consumption of atmospheric risers. These data were used to determine the size of risers. Results show that the feeding range of risers in the case of plate castings up to thicknesses of 15 mm. amounts to 15 thicknesses and in castings of bars to ten times the bar diameter.

8571 (German.) The Basic Hot-Blast Cupola in the Integrated Steel Works. **Der basische Heisswind-Kupolofen im gemischten Hüttenwerk.** Heinz Voigt. *Stahl und Eisen*, v. 78, no. 5, Mar. 6, 1958, p. 284-291.

Metallurgical possibilities for the application of the hot-blast cupola. Economic considerations.

8572* (Russian.) The Effect of Iron on the Properties of the Bronze Layer in Bimetallic Products. **Vliianie zheleza na svoĭstva bronzovogo sloia bimetallicheskikh izdeliĭ.** E. M. Morozova and N. M. Leibova. *Stanki i Instrument*, v. 29, no. 1, Jan. 1958, p. 21-23.

Centrifugal pouring invariably leads to an increased Fe content in the bronze bimetallic layer.

8573 (Czech.) Precision Casting by the Lost-Wax Method. **Přesné lití metodou vytavitelných modelů.** L. Šrámek. *Strojírenství*, v. 8, no. 2, Feb. 1958, p. 123-126.

Principles and advantages of precision casting with fusible patterns. The molding procedure and range of applicability of this method is shown by examples. Economical and technological advantages of precision casting, which replaces machining, is suitable for casting parts of complicated shape.

8574* (Russian.) Induction Heating of Nickel, Titanium, and Brass Blocks With Industrial Frequency Electric Current. **Induktsionnyi nagrev slitkov nikelia, titana i latuni tokami promyshlennoi chastoty.** S. S. Zuev and V. V. Krapukhin. *Tsvetnye Metally*, v. 31, no. 2, Feb. 1958, p. 63-68.

Induction heating is recommended for blocks of diameters more than 150 mm. for brass, 200 mm. for Ni, and 250 mm. for Ti. The consumption of energy for blocks 300 mm. in diameter is equal to 176 kw-hr. for brass heated to 750 C, 286 kw.-hr. for Ni heated to 1060 C, and 360 kw.-hr. for Ti heated to 860 C.

See also: **8454** (properties of nodular iron); **8628** (malleabilization of cast iron); **8713** (solidification mechanism of gray cast iron); **8714** (graphitization of spheroidal cast iron at hypoeutectoid temps.); **8726** (structure of nodular iron).

METALS—HEAT TREATMENT

8575* (Russian.) The Effect of the Rate of Heating for Tempering on the Non-Uniformity of Carbon Concentration in Austenite. **Vliianie skorosti nagreva pod zakalku na neodnorodnost' kontsentratsii ugleroda v austenite.** A. G. Spektor. *Fizika Metallov i Metallovedenie*, v. 5, no. 1, 1957, p. 142-149.

Experimental study of the steel containing 1% C, and 1.4% Cr with an initial structure of granular perlite, subjected to 650 c.p.s. induction heating, and tempering at different temperatures.

8576* (German.) Heat Treatment of Steels Used in the Fabrication of Pressure Casting Dies. **Wärmebehandlung der für Druckgiessformen gebräuchlichen Stähle.** Karl Schönert. *Giesserei*, v. 45, no. 6, Mar. 13, 1958, p. 133-139.

General behavior of steels during hardening; stress-relieving annealing. Oil quenching, hot quenching, and air-hardening. Tempering; nitriding; hardness testing.

8577 Applications of Furnace Atmospheres. IV. C. E. Peck. *Industrial Heating*, v. 25, Feb. 1958, p. 258 + 5 pages.

Features of controlled atmosphere furnaces. Chart indicates atmospheres suitable for various heat treatments.

8578 (Russian.) Stress Relaxation in Hardened Y12A Steel. **Relaksatsiia napriazhenii zakalennoi stali Y12A.** A. A. Gol'denberg. *Metallovedenie i Obrabotka Metallov*, 1958, no. 2, Feb., p. 6-11.

Study of the relaxation process in hardened steel containing 1.1% C, 0.18% Mn, 0.12% Si, 0.015% P, and 0.020% S. Effect of temperature, tempering time, structural stability, and initial stresses on reduction of internal stresses during tempering.

8579 (Russian.) Induction Heating of Products of Heavy Cross Section With Commercial Frequency Currents. **Induktsionnyi nagrev tokami promyshlennoi chastoty izdelii bol'shogo secheniia.** V. V. Aleksandrov. *Metallovedenie i Obrabotka Metallov*, 1958, no. 2, Feb., p. 23-28.

A series of experiments to investigate the heating of various sizes of pipes and plates. Pipes made from various steels were heated to 400, 650, 850, and 1000 C with heating speeds up to 670 C per min.

8580 The Re-Nitriding of Steel. G. J. Cox. *Metal Treatment and Drop Forging*, v. 25, Feb. 1958, p. 47 + 5 pages.

Literature survey and experimental data indicate that Al-Cr-Mo and Cr-Mo-V steels can be restored to full hardness after annealing. (To be continued.)

8581 Oils for the Quenching of Steel. H. E. Priston. *Metal Treatment and Drop Forging*, v. 25, Feb. 1958, p. 57-64.

Properties, evaluation, handling, and testing of heat-treatment oils.

See also: **8378** (furnace for annealing from −196 to 200 C); **8604** (stress relief of stainless steel by tempering); **8617** (nitriding of structural steels); **8641** (case hardening of gears).

METALS—MECHANICAL AND PHYSICAL PROPERTIES

8582* (English.) **Fatigue Tests on Basic-Bessemer and Open-Hearth Steels.** Alfred Funck. *Acier, Stahl, Steel*, v. 23, no. 1, Jan. 1958, p. 19-24.

Fatigue tests on modern structural steels showed no difference between their fatigue behavior. There is strong correlation between fatigue limit and tensile strength.

8583 Polyslip in Polycrystals. U. F. Kocks. *Acta Metallurgica*, v. 6, Feb. 1958, p. 85-94.

The idea that polyslip is responsible for the plastic deformation of cubic polycrystals at low enough temperatures is discussed in the light of new evidence.

8584* (German.) Influence of Small Quantities of Impurities on the Hot Hardness of Tungsten. **Einfluss Geringer Mengen von Verunreinigungen auf die Warmhärte des Wolframmetalls.** T. Millner and L. Sass. *Acta Technica Academiae Scientiarum Hungaricae*, v. 19, nos. 1/2, 1957, p. 115-125.

Determination of semi-micro heat hardnesses of various kinds of W alloys in the interval of 20 to 800 C. The W wires made with additions containing Si had an average hardness H_v=250 at 800 C, while without such additions values of H_v=180 were found.

8585* (Russian.) The Study of the Longitudinal and Transverse Galvanomagnetic Effect in *n*-Type Germanium Single Crystals Cut Along the Main Crystallographic Axes. **Issledovanie prodol'nogo i poperechnogo gal'vanomagnitnykh effektov na monokristalle germaniia *n*-tipa po glavnym kristallograficheskim osiam.** R. G. Annaev and A. Allanazarov. *Akademiia Nauk SSSR, Doklady*, v. 118, no. 1, Jan. 1, 1958, p. 47-50.

Shows that initial electroconductivity and galvanomagnetic effects depend on crystallographic direction in the Ge-monocrystal.

8586 (Russian.) Effect of Hydrogen on Strained Steel. **O deistvii vodoroda na deformiruemuiu stal'.** G. V. Karpenko and P. I. Kripiakevich. *Akademiia Nauk Ukrains'koi RSR, Dopovidi*, 1958, no. 1, p. 37-40.

Shows that in the process of steel deformation, hydrogenization occurs along the shift lines in galvanic processes. In this case the hydrogenization leads to a loss of plasticity in soft steel and a reduced real breakdown strength. The durability and fluidity limits remain unchanged.

8587* (Italian.) The Influence of Mn on the Properties of AC 11 Alloy Extruded Sections. **Influenza del manganese sulle caratteristiche strutturali degli estrusi di lega Anticorodal 11.** E. Di Russo and D. Gualandi. *Alluminio*, v. 27, no. 2, Feb. 1958, p. 55-61.

Critical cold working increases with the Mn content. Macrostructure is improved by reduction of the recrystallized zone and a better uniformity of mechanical properties is obtained.

8588* (Russian.) Investigation of the Effect of Cold Working on the Cold Shortness of Steel and Welded Joints. **Issledovanie vliianiia naklepa na khladnolomkost' stali i svarnykh soedinenii.** B. F. Lebedev. *Avtomaticheskaia Svarka*, v. 11, no. 1, Jan. 1958, p. 28-31.

The effect of cold working obtained by 0.5 to 1.5% stretching and bending.

8589 The Effect of Different Surface Treatments on the Fatigue Strength of Drill Steel. T. W. Wlodek. *Canadian Mining and Metallurgical Bulletin*, v. 51, no. 550, Feb. 1958, p. 89-101.

The relative merits of shot peening, induction surface hardening, spiral-rolling, and the combination of these surface treatments are evaluated on the basis of their capacity to increase the fatigue strength of drill steel.

8590* (French.) Effect of Impurity Bands in Germanium With Zinc Addition, at a Very Low Temperature. **Effet de bande d'impuretés dans le Germanium dopé an Zinc, à très basse température.** Wladimir Mercouroff. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences*, v. 246, no. 7, Feb. 17, 1958, p. 1013-1015.

Samples of Ge with a considerable Zn addition (10^{16} to 10^{17} atoms/cm^3) and compensated with Sb, may offer an electric conductivity and a Hall effect varying with the electric field at low temperatures.

8591 Super-Strength Alloys. *Design News*, v. 13, Mar. 3, 1958, p. 100-102.

Charts give design data on Cr-Ni-Fe, Cr-Ni-Co-Fe, Ni-base, and Co-base American and British alloys.

8592* (Russian.) Comparative Measurement of Cr and Fe Vapor Pressures, Judged by the Rate of Evaporation Into a Vacuum. **Sravnitel'nye izmereniia davleniia parov khroma i zheleza po skorosti isparenija v vakuum.** V. D. Burlakov. *Fizika Metallov i Metallovedenie*, v. 5, no. 1, 1957, p. 91-101.

8593* (Russian.) Latent Deformation Energy of Solid Solution Alloys. **K voprosu o skrytoi energii deformatsii splavov tverdykh rastvorov.** V. E. Panin and V. G. Milevskaia. *Fizika Metallov i Metallovedenie*, v. 5, no. 1, 1957, p. 120-126.

The Cu-Ni alloy, Cu, Ni, and an alloy of 61.20% Cu, 38.61% Zn, and 1.19% Sn, Pb, and Mn were examined.

8594* (Russian.) Domain Structure of the High-Coercive Mn-Bi Alloy. **O domennoi strukture vysokokoertsitivnogo splava marganets-vismut.** Ia. S. Shur, E. V. Shtol'ts, G. S. Kandaurova, and L. V. Bulatova. *Fizika Metallov i Metallovedenie*, v. 5, no. 2, 1957, p. 234-240.

Study of the structure and its changes under the effect of a magnetic field. It was found that overmagnetization basically depends on the initial magnetized state. A visual observation of the overmagnetization of the separate crystals was successful for the first time by the rotation method.

8595* (Russian.) Behavior of the Surface of Metallic Bodies Subjected to Mechanical and Heat Treatment. **Povedenie poverkhnostnogo sloia metallicheskikh tel, podvergnutykh mekhanicheskoi i termicheskoi obrabotke.** B. M. Rovinskii and V. I. Mokeeva. *Fizika Metallov i Metallovedenie*, v. 5, no. 2, 1957, p. 331-339.

Structure, stresses, and the properties of steels 45 and 40X were studied after they were processed on a turret lathe, polished, ground, buffed, and annealed under a vacuum at 750 C for 2 hrs., followed by tempering at 600 C for 1 hr. with ensuing cooling in the furnace.

8596* (French.) Brinell Hardness in Cast Iron. **Sur la dureté Brinell des fontes.** J. Van Eeghem. *Fonderie Belge*, 1958, no. 2, Feb., p. 58-60.

In the case of a hardness higher than 160 the following ratio is generally used: load in kg/(Dia. of the ball in mm)^2=30. In the case of soft cast iron this ratio should be 10.

8597 Softening of Cold-Worked Metal by Alternating Strain. W. A. Wood and R. L. Segall. *Institute of Metals, Journal*, v. 86, Jan. 1958, p. 225-228.

Specimens of cold-worked Cu, Ni, and Al were subjected to alternating-torsion tests, and measurements were made of the proof stresses required to impose successive reversals of plastic strain.

8598 The Extrapolation of the Stress-Rupture Properties of the Nimonic Alloys. W. Betteridge. *Institute of Metals, Journal*, v. 86, Jan. 1958, p. 232-237.

8599* (Spanish.) Effect of Machining on the Magnetic Properties of a Silicon Steel. **Influencia de los cortes mecanicos en las propiedades magneticas de un acero al silicio.** Victor S-Giron Nuñez. *Instituto del Hierro y del Acero*, v. 10, no. 54, Oct.-Dec. 1957, p. 429-440.

A study of five samples in different states of tension, varying in their magnetic properties by more than 100%. Linear variation of the coercive field and hysteresis losses, as function of a parameter related to the reversible magnetization process.

8600 Internal Friction. Stress Relaxation Across Interfaces. P. M. Robinson and R. Rawlings. *Iron & Steel*, v. 31, no. 3, Mar. 1958, p. 97-100.

Friction phenomena due to relaxation across grain boundaries or defects in metals. Internal interfaces.

8601 The Effect of Phosphorus on the Tensile and Notch-Impact Properties of High-Purity Iron and Iron-Carbon Alloys. B. E. Hopkins and H. R. Tipler. *Iron and Steel Institute, Journal*, v. 188, pt. 3, Mar. 1958, p. 218-237.

8602* (Russian.) Effect of Temperature, Degree and Rate of Deformation on the Resistance of Carbon Steels to Plastic Deformation. **Vliianie temperatury, ekorosti i stepeni deformatsii na soprotivlenie plasticheskomu deformirovaniiu uglerodstykh stalei.** Z. A. Ridner and A. P. Chekmarev. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, 1957, no. 12, Dec., p. 22-29.

Deformation was studied in the range from 800 to 1200 C at rates from 2 to 300 sec.$^{-1}$ according to conditions of the usual processing of metals (rolling, quenching, forging).

8603* (Russian.) The Effect of the Degree of Preliminary Deformation on an Alloy's Resistance to Heat. **Vliianie stepeni predvaritel'noi deformatsii na zharoprochnost' splavov.** Iu. A. Preobrazhenskaia. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, 1957, no. 12, Dec., p. 30-37.

8604* (Swedish.) Stress Relief of Stainless Steel Strips by Tempering. **Avspänningsanlöpning av austenitiska rostfria band.** F. de Kazinczy. *Jernkontorets Annaler*, v. 142, no. 1, 1958, p. 5-14.

The internal stress distribution of residual stresses during tempering is studied. Body stress lowering during first stage of tempering (below 200 C) is interrelated with leveling of textural stresses. A further decrease during the second stage (above 300-400 C) is probably due to relaxation by creep.

8605 Measurements of Quenching Stresses in a Bearing Ring by Interference Fringes. Toshio Mura and Hiroshi Yoshimoto. *Journal of Applied Physics*, v. 29, Feb. 1958, p. 115-119.

Variations of residual stresses in a ring of bearing steel were calculated from the deflections of the ring from the horizontal (a plane perpendicular to the axial direction).

8606 Internal Friction in Aluminum at Low Temperatures. A. J. Filmer, G. J. Hutton, and T. S. Hutchison. *Journal of Applied Physics*, v. 29, Feb. 1958, p. 146-148.

Measurements at 40 kc. of the internal friction of 99.992% Al as a function of temperature yield a number of attenuation maxima at temperatures between 90 and 300 K. These maxima are of two types, a broad maximum at about 225 K and a series of very sharp peaks at lower temperatures. The latter are tentatively associated with the break away of dislocations from minor pinning points.

8607 Surface Tension of Titanium, Zirconium, and Hafnium. A. W. Peterson, H. Kedesdy, P. H. Keck, and E. Schwarz. *Journal of Applied Physics*, v. 29, Feb. 1958, p. 213-216.

Average values obtained in pure Ar atmosphere by the drop-weight method were 1390 ± 40, 1400 ± 40, and 1460 ± 40 dynes/cm. respectively.

8608* Vickers Hardness and Compressive Strength. D. S. Dugdale. *Journal of the Mechanics and Physics of Solids*, v. 6, no. 2, 1958, p. 85-91.

Hardness and compression tests are reported for 22 materials. A simple empirical method for relating hardness number to the stress-strain curve is suggested. The correlation obtained leads to the conclusion that the Vickers test is not at all sensitive to yield stresses corresponding to compressive strains greater than 0.15.

8609* The Propagation of Fatigue Cracks in Sheet Specimens. N. E. Frost and D. S. Dugdale. *Journal of the Mechanics and Physics of Solids*, v. 6, no. 2, 1958, p. 92-110 + 1 plate.

Fatigue tests were carried out on mild steel, Al alloy, and Cu specimens containing small central slits.

8610* The Basal Slip in Zinc Under Static and Dynamic Loading. T. Vreeland Jr., D. S. Wood, and D. S. Clark. *Journal of the Mechanics and Physics of Solids*, v. 6, no. 2, 1958, p. 111-126.

An investigation of static and dynamic shear behavior of two purities of Zn single crystals. All crystals tested were in the form of cylindrical rods with the [0001] crystallographic direction parallel to the rod axis.

8611* On the Effect of Friction on Compression and Indentation Between Flat Dies. J. F. W. Bishop. *Journal of the Mechanics and Physics of Solids*, v. 6, no. 2, 1958, p. 132-144.

Relevant theoretical work under plane-strain conditions with both overhanging and indenting smooth and rough dies for various geometrical configurations is reviewed.

8612 A High-Temperature Centrifuge for Creep, Rupture, and Bend Tests. I. I. Kornilov. *Journal of Metals*, v. 10, Mar. 1958, p. 187-189.

Maximum temperature attainable is 1000 to 1200 C and stresses up to 100 kg. per sq. mm. are permitted. Time of test is not restricted.

8613 (English.) **Experimental Studies on Fatigue Crack Propagation in Torsion.** Jan Hult. *Kunglia Tekniska Högskolans Handlingar*, no. 119, 1958, 46 pp. (T4 K96t Vis.)

A previous theory for the initiation and growth of fatigue cracks is extended to the case of crack growth from a rounded V-shaped notch. Crack propagation in reversely twisted Al bars was studied. An unexpected deceleration of the crack growth is found to follow the initial state.

8614 Compressive Deformation As a Means of Effecting Stress Relief in Aluminum Forgings. R. E. Kleint and Frank G. Janney. *Light Metal Age*, v. 16, Feb. 1958, p. 14-21.

Compressive deformation effects significant stress relief and compares favorably to stress relief by stretching. The 7075-W samples were in the optimum heat treat condition.

8615* (Dutch.) Copper and Copper Alloys. **Koper en koperlegeringen. XVII.** Microhardness Measurements on Several Copper Alloys. **Microhardheidsmetingen op een aantal koperlegeringen.** W. G. R. DeJager. *Metalen*, v. 13, no. 3, Feb. 15, 1958, p. 49-52.

In cast bronze the hardness of the α-phase varied with Sn content. Higher hardness occurred at the edge zone of the α-mixed crystal. The δ-phase has a face-centered cubic lattice and the composition Cu_{31} Sn_8.

8616* (German.) Study of the Aluminum-Zinc System. **Studien im System Aluminium-Zink.** E. Pelzel. *Metall*, v. 12, no. 3, Mar. 1958, p. 197-201.

Decomposition heat, hardness, and compression resistance of binary alloys.

8617* (German.) Effect of Gas and Salt Bath Nitriding on the Properties of Structural Steels. **Der Einfluss des Gas- und Salzbadnitrierens auf die Eigenschaften von Konstruktionsstählen. I.** H. Wiegand and M. Koch. *Metalloberfläche*, v. 12, no. 3, Mar. 1958, p. 69-74.

Definition of nitriding process. Structure of the nitriding layers. Effects of temperature. Effect of alloying elements on increase of hardness. Fatigue strength of C15 steel after nitriding. Effects of cooling and annealing.

8618 (Russian.) Mechanical Properties of Some High-Strength Alloy Steels. **Mekhanicheskie svoistva nekotorykh vysokoprochnykh legirovannykh stalei.** I. V. Paisov and Zo Iun Kho. *Metallovedenie i Obrabotka Metallov*, 1958, no. 2 ,Feb., p. 2-6.

Dependence of mechanical properties on tempering temperature and chemical composition. Two steels possessing high mechanical properties in a temperature range from +20 to −30 C are recommended.

8619 (Russian.) Creep Strength of Welded Joints at High Temperatures. **Dlitel'naia prochnost' svarnykh soedinenii pri vysokikh temperaturakh.** A. V. Staniukovich and V. N. Zemzin. *Metallovedenie i Obrabotka Metallov*, 1958, no. 2, Feb,. p. 12-18.

Development of a method for investigating the efficiency of welded joints exposed to static loads and high temperatures with special attention to determination of creep strength. Mechanical properties of steels, deposited metal, and welded joints.

8620 (Russian.) Some Features of the Fatigue Fracture Process in Alloys at Elevated Temperatures. **Osobnennosti protsessa ustalostnogo razrusheniia splavov pri vysokikh temperaturakh.** V. A. Parfenov. *Metallovedenie i Obrabotka Metallov*, 1958, no. 2, Feb., p. 19-22.

Evaluation of the heat-resistant characteristics of alloys by determining the relationship between limits of creep strength and ultimate strength.

8621* (Italian.) Research on Copper-Chromium-Silicon and Copper-Cobalt-Silicon Alloys With High Electric Conductivity. **Ricerche su leghe di rame-cromo-silicio e rame-cobalto-silicio ad elevata conducibilità elettrica.** Sergio Gallo. *Metallurgia Italiana*, v. 50, no. 1, Jan. 1958, p. 15-19.

Study of two highly conductive, high hardness, heat-treatable Cu alloys for electric resistance welding electrodes.

8622 A Survey of the Structural Properties of Some High Strength Sheet Steels. M. A. Melcon. *North Atlantic Treaty Organization, AGARD Report No.* 101, Apr. 1957, 25 pp. (TL565 Ag11r Vis.)

Deals with 420, 422, 422M, AM350, and 17-7PH stainless steels, also Tri-cent, a low alloy steel and Thermold "J", a tool steel.

8623* (English.) **The Thermoelectric, Galvanomagnetic and Thermomagnetic Effects of Monovalent Metals.** Mikio Tsuji. *Physical Society of Japan, Journal*, v. 13, no. 2, Feb. 1958, p. 133-148.

Theory is based on a model of general spherical energy band. Effect of the Umklapp processes on time of relaxation at high temperatures is investigated.

8624 Vibration Spectra of Vanadium and a Mn-Co Alloy by Neutron Spectrometry. A. T. Stewart and B. N. Brockhouse. *Reviews of Modern Physics*, v. 30, no. 1, Jan. 1958, p. 250-255.

8625* (French.) Plan of a Series of Tests on the Resistance of Angle Weldings. **Plan d'une série d'essais sur la résistance des soudures d'angle.** *Revue de la Soudure (Brussels)*, v. 13, no. 4, 1957, p. 227-238.

Basic principles of mathematical statistics applied to tests. Influencing factors: types of stress, geometrical variables, welding position, and welding groove. Conditions to be maintained with a large number of test pieces.

8626 The Thermal Conductivity of Lead at Low Temperatures. H. Montgomery. *Royal Society, Proceedings*, v. 244, ser. A, Feb. 25, 1958, p. 85-100.

8627 (German.) Notch Impact Strength of Nickel. **Zur Kerbschlagzähigkeit von Nickel.** P. Kuhn. *Schweizer Archiv für Angewandte Wissenschaft und Technik*, v. 24, no. 2, Feb. 1958, p. 59-62.

Specimens of 99% Ni with definite C, Si, Mn, Fe, Al, C, and S contents and with three different notch types were tested between −60 and +100 C.

8628* (Czech.) Effect of Malleabilization in Liquid or Gaseous Atmospheres on Mechanical Properties of Malleable Cast Iron. **Vliv temperování v kapalném a plynném prostředí na mechanické vlastnosti temperované litiny.** Čestmír Hloušek. *Slévárenství*, v. 6, no. 2; *Prace Československého Výzkumu Slévárenského*, v. 5, no. 3, Feb. 1958, p. 23-30.

Effect of the first graphitization period on mechanical properties and structure. With rising temperature (900-1100 C) mechanical values of malleable cast iron decrease. Annealing for optimum mechanical properties is described.

8629 (German.) The Shape of the Temperature Curve of the Notch Toughness and the Fracture Appearance in the Transition Range From the High to the Low Value. **Der Temperaturverlauf der Kerbschlagzähigkeit und das Bruchaussehen im Übergang von der Hoch- zur Tieflage.** Alexander Schepers and Franz-Rudolf Licht. *Stahl und Eisen*, v. 78, no. 4, Feb. 20, 1958, p. 227-235.

Determination of the notch toughness. Fracture appearance and bending angle as dependent on the testing temperature on DVM test bars taken from round bars of killed open-hearth steel (St 37, St 42, and steel having a tensile strength of 58.0 kg/mm²) and from mining channels of basic converter steel of the rimming type (St 50).

8630 (Czech.) Relaxation of Heat-Resisting Ferritic-Pearlitic Steels. **Relaxace žárupevných ferrito-perlitických ocelí.** J. Kermes. *Strojírenství*, v. 8, no. 1, Jan. 1958, p. 55-57.

Analysis of results obtained in testing the relaxation properties of Cr-V, Cr-Mo-V, Cr-W-V, and Cr-Mo-W-V steels. Diagrams of relationships between initial and residual stresses for these materials at 300, 400, and 500 C during periods of 500, 5000, and 10,000 hrs., the best properties were shown by the Cr-Mo-W-V steel.

8631* (Russian.) Mechanical Properties of Aluminum Alloys in the Temperature Range of Crystallization During Welding. **Mekhanicheskie svoistva aliuminievykh splavov v intervale temperatur kristallizatsii pri svarke.** *Svarochnoe Proizvodstvo*, 1958, no. 2, Feb., p. 1-6.

Equipment and methods for determining strength and plasticity of the metal during the crystallization process.

8632* (Russian.) Investigation of Cracking Tendencies of Welded Joints of Titanium and Its Alloys. **Issledovanie sklonnosti svarnykh soedinenii titana i ego splavov k obrazovaniiu treshchin.** E. A. Guseva. *Svarochnoe Proizvodstvo*, 1958, no. 2, Feb., p. 10-14.

Cold cracking is connected with volume changes during structural transformations which start at elevated temperatures and continue for long periods at room temperature. The expansion of α-alloys of Ti increases with increase in H content in the weld metal. An increase of N and O content in welds causes cracking and decreases the plasticity of the weld metal.

8633* (Russian.) Resistance to Vibration of Welded Joints in Low-Alloy and Low-Carbon Steels. **O vibratsionnoi prochnosti svarnykh soedinenii iz nizkolegirovannykh i malouglerodistykh stalei.** M. M. Kraichik and R. S. Ratner. *Svarochnoe Proizvodstvo*, 1958, no. 2, Feb., p. 18-22.

Effect of asymmetry of vibrations on the resistance of welds to vibratory stresses.

8634* (Russian.) Properties of Welded Joints of Large-Section Cast and Rolled Metal Performed With Oxy-Acetylene Pressure Welding. **Svoistva soedinenii litogo i prokatnogo metalla bol'shikh sechenii vypolnennykh gazopressovoi svarkoi.** F. S. Tkachenko, K. V. Selivanov, and A. K. Shvylpov. *Svarochnoe Prozvodstvo*, 1958, no. 2, Feb., p. 25-28.

Determination of applicability of oxy-acetylene pressure welding in manufacturing large structures from cast and rolled steel elements of large cross section. Welds possess a homogeneous structure and their mechanical characteristics are close to those of the base metal.

8635 (German.) Factors Affecting the Strength Properties of Ferromagnetics in the Magnetic Field. **Beeinflussbarkeit der Festigkeitseigenschaften von Ferromagnetika im Magnetfeld.** H. Jahn. *Technik*, v. 13, no. 2, Feb. 1958, p. 94-99.

Annealing of Fe-specimens with subsequent magnetic field treatment, with air or water cooling. Hardness, tensile strength, and notch impact strength of specimens with different C contents. Application to carbon-poor steels and to Cr-alloyed heat-treatable structural steel.

8636* (English.) **Fatigue of Metals. II.** C. E. Phillips. *Teknisk Ukeblad*, v. 105, no. 8, Feb. 20, 1958, p. 169-175.

Influence of notches and stress gradients. Theories of fatigue failure. Design considerations for avoiding fatigue failures at joints of several kinds.

8637* (English.) **Elasticity Constants of Single Crystals of Nickel-Copper Alloys.** Yûki Shirakawa and Ken'ichi Numakura. *Tôhoku University, Science Reports of the Research Institutes, Ser. A. Physics, Chemistry, Metallurgy*, v. 10, no. 1, Feb. 1958, p. 51-57.

8638 A Study of the Metallurgical Properties That Are Necessary for Satisfactory Bearing Performance and the Development of Impoved Bearing Performance and the Development of Improved Bearing Alloys for Service up to 1000 F. Gopal K. Bhat and Alvin E. Nehrenberg. *U. S. Air Force, Wright Air Development Center, WADC Technical Report* 57-343, Nov. 1957, 68 pp. (TL507 Un3.18w Vis.)

Halmo-1, T1, M2, M10, and M50 appear to be the most promising materials for high temperature service.

8639 Investigation of the Effects of Incongruous Elements and the Interaction Effects of These Elements on High Temperature Strength of Fe-Co-Ni-Cr Alloys. J. H. Sye, T. L. Robertshaw, and F. M. Richmond. *U. S. Air Force, Wright Air Development Center, WADC Technical Report* 57-426, Dec. 1957, 102 pp. (TL507 Un3.18w Vis.)

A study of the effect of various combinations of Al, Ti, Mo, B, Zr, and C on the high temperature properties of vacuum melted alloys with a base composition of 60 at.% Ni, 20 at.% Cr, 10 at.% Fe, and 10 at.% Co.

8640 Mechanical Properties of Aluminum Alloy M-388; Effect of Fabrication Variables. R. S. Kemper and K. F. Powell. *U. S. Atomic Energy Commission, HW*-54364, Jan. 6, 1958, 30 pp. (UF767 Un3.1hw Contin.)

Annealing behavior of above cold worked up to 50% reduction in area, as determined by tensile properties; microstructure changes during annealing and aging tests.

8641* (German.) The Proper Depth of Hardening in Surface-Hardened Gear Pinions. **Die zweckmässige Einhärtungstiefe bei oberflächengehärteten Getriebezähnen.** Heinz Glaubitz. *VDI Zeitschrift*, v. 100, no. 6, Feb. 21, 1957, p. 216-226.

Establishes the conditions under which pitting, peeling, and tooth breaking may occur.

8642 The Minimum Bend Radii of Aluminium Alloy Tubes. D. A. Barlow. *Welding and Metal Fabrication*, v. 26, Mar. 1958, p. 90 + 6 pages.

Minimum bend radii, flattening and springback values were determined, or estimated, for all types of bending and all likely alloys, for circular tubes with D/t ratios up to 40.

8643* Magnetism in Materials. III. Commercial Magnetic Materials and Domain Theory. D. H. Martin. *Wireless World*, v. 64, Mar. 1958, p. 126 + 5 pages.

Properties and applications of magnetically soft materials. (To be concluded.)

8644* (German.) Light Conductivity and the Hall Constant. **Leitfähigkeit und Hallkonstante. VIII.** Alpha-Silver-Zinc Alloys. **Alpha-Silber-Zink-Legierungen.** Werner Köster and Hans-Eberhard Schmidt. *Zeitschrift für Metallkunde*, v. 49, no. 2, Feb. 1958, p. 87-90.

The resistivity and Hall constant of α-Ag-Zn solid solutions were measured up to 24% Zn as a function of thermal and mechanical treatment. Effects of dislocations and point defects were estimated.

8645* (German.) The Mechanical Properties of Rolled-Lead Alloys. **Über die mechanischen Eigenschaften von Walzblei-Legierungen.** Erich Pelzel. *Zeitschrift für Metallkunde*, v. 49, no. 2, Feb. 1958, p. 102-110.

The influence of alloying on the tensile strength, ultimate strain, and hardness of certain Pb alloys. Effect of aging treatments is discussed.

8646* (German.) Spectroscopic Analysis of the Evaporation Process in Binary Alloys. **Spektralanalytische Untersuchung des Verdampfungsvorganges binärer Legierungen.** E. Saur and E. Unger. *Zeitschrift für Naturforschung*, v. 13a, no. 2, Feb. 1958, p. 72-79.

Condensate weight and spectroscopic analysis of their composition made it possible to determine the dissociation process within alloys during evaporation.

8647* (German.) Measurements of the Hall Effect in Ferromagnetic Nickel Layers. **Messungen des Hall-Effektes an ferromagnetischen Nickelschichten.** Ludwig Reimer. *Zeitschrift für Physik*, v. 150, no. 3, 1958, p. 277-286.

Measurement of the Hall effect in evaporated Ni coatings in relation to the thickness of the specimens and the temperature of the glass base. Effect of the saturation field intensity.

8648* (German.) Magnetic Investigations of Chromium and Chromium Mixed Crystals. **Magnetische Untersuchungen an Chrom und Chrom-Mischkristallen.** Rudolf Lingelbach. *Zeitschrift für Physikalische Chemie (Frankfurt)*, v. 14, nos. 1-2, Jan. 1958, p. 1-31.

Susceptibility of a Cr specimen free of O and N between 66 and 805 K. Study of the magnetic behavior of binary and ternary Cr mixed crystals with the transition elements V, Mn, Fe, and Co between 66 and 293 K.

8649* (German.) Measurements in Relation to the Electronic Theory of Mechanical Resistance. **Messungen zur elektronischen Theorie der mechanischen Festigkeit.** G.-M. Schwab, J. Tsipuris, and M. Tsipuris. *Zeitschrift für Physikalische Chemie (Frankfurt)*, v. 14, nos. 1-2, Jan. 1958, p. 65-75.

Measuring hardness of the Hume-Rothery alloys, Cu-Sn, Cu-Zn, Ag-Zn, and Ag-Cd in a certain order and at temperatures up to the melting points. Hardness, temperature coefficient, and energy of formation of the dislocation have a maximum in the γ-phases.

8650* (Russian.) Heat Effects During Melting in the System Lead-Tin-Bismuth. **Teplovye effekty pri plavlenii v sisteme svinets-olovo-vismut. I.** The Equilibrium Diagram of the Ternary System Pb-Sn-Bi. **Diagramma ravnovesiia troinoi sistemy Pb-Sn-Bi.** R. B. Gershman. *Zhurnal Fizicheskoi Khimii*, v. 32, no. 1, Jan. 1958, p. 12-18.

Data were presented on the heats of melting and the temperature dependence of the specific heat in the region of separation for 48 alloys of the ternary system. Equilibrium diagrams for the system were made.

See also: **8087** (heats of formation of liquid Ag-Au, Ag-Cu, and Au-Ni alloys); **8160** (Zn plating and mechanical properties of malleable cast iron); **8194** (fatigue of electric power transmission lines); **8222** (conductivity of silicides); **8236** (mechanical properties of electrolytic Cu); **8364** (autographic stress-strain recorder); **8365** (high-speed tension testing machine); **8404** (friction and wear of sintered Cu); **8406** (allowable stresses in Al compression members); **8430** (weight-strength properties of Ti, Al, and stainless steel); **8444** (rupture strength of superstrength alloys); **8559** (high hot strength stainless castings); **8569** (treatment and mechanical properties of malleable iron); **8701** (fine structure and impact strength of welded seams); **8708** (atomic densities of molten Al and Bi); **8717** (slip in Al alloy); **8729** (specific heat and resistivity of Ag_3Mg); **8736** (ferromagnetic domain structure in a 40% Co-Ni single crystal); **8738** (dimensional stability of U); **8749** (physical properties of sinter); **8905** (alnico magnets).

METALS—MECHANICAL WORKING

8651 Data-Controlled Milling. Peter J. Farmer. *Aircraft Production*, v. 20, Mar. 1958, p. 102-113.

Continuous automatic machining regulated by analog data.

8652 Machining Ultra-High-Tensile Steels. II. Drilling and Tapping Tests: Importance of Drill-Point Concentricity and Re-Introduction of Serial Taps for Uniform Metal-Removal. H. J. Pearson. *Aircraft Production*, v. 20, Mar. 1958, p. 114-118.

8653 Now, Tool Control to 5 Millionths. *American Machinist*, v. 102, Mar. 24, 1958, p. 120-121.

Micro-inch dimensional control of centerless grinders can be accomplished by replacing the leadscrew and nut with a linear-actuator motor.

8654 Chemical Milling: Where and How. I. Where to Use Chemical Milling. Jay Sullivan. **II. How to Do Chemical Milling.** Ken Clark. *American Machinist*, v. 120, Mar. 24, 1958, p. 122-127.

Capabilities, limitations, techniques, and applications.

8655* Theory of Regenerative Machine Tool Chatter. I-II. S. A. Tobias and W. Fishwick. *Engineer*, v. 205, Feb. 7, 1958, p. 199-203; Feb. 14, 1958, p. 238-239.

Equations are set up to describe chatter in the plane perpendicular to the cutting velocity. Stability charts are derived to show rotational speeds at which a given system is stable, unstable, or at the threshold of stability for a given structure and a given tool, work piece material, and machining condition. The charts are plotted in terms of group parameters; the ordinate is the rate of critical to effective damping, and the abscissa represents the rotational speed multiplied by the number of cutting edges divided by the natural frequncy of the mode of vibration whose stability is being investigated. The chart is divided into areas of various stability by boundary lines whose location can be calculated.

8656* Cold Rolling Mill for Very Thin Strip. *Engineer*, v. 205, Feb. 21, 1958, p. 272-274.

Methods devised to enable an ordinary two-high rolling mill used in conjunction with a simple insert mill to roll nickel-iron tapes up to 1-in. wide to thicknesses of the order of 0.0001-in.

8657* Principles and Applications of Spark Machining. D. W. Rudorff. *Institution of Mechanical Engineers, Proceedings*, v. 171, no. 14, 1957, p. 495-511 + 6 plates.

Historical background of electro-erosion technique; difference between spark and arc discharges. The underlying principle of the relaxation-type spark circuit as employed in industrial machines; development trends. Various factors bearing upon the efficiency of spark-erosion operations. Mechanical features of a typical spark-erosion machine; the range of machining operations for which spark cutting machines can be designed. Typical samples of work produced on a commercial unit; properties of spark-machined surfaces. A most important use of the sprak-cutting process in the working of hardened steels or other hard metals, is the formation of irregularly shaped apertures in WC extrusion and blanking dies.

8658 The Closing of Internal Cavities in Forgings by Upsetting. A. Tomlinson and J. D. Stringer. *Iron and Steel Institute, Journal*, v. 188, pt. 3, Mar. 1958, p. 209-217.

Upsetting tools with dished faces were developed which permit upset pieces to be produced free from cavities and of a suitable shape for reforging. The reforged pieces should have satisfactory mechanical properties at the positions of healed cavities.

8659* Mill and Laboratory Evaluation of Oils for Rolling of Copper Alloys. F. L. Reynolds. *Lubrication Engineering*, v. 14, no. 3, Mar. 1958, p. 98 + 6 pages.

Tests cover lubricant effectiveness or load carrying ability, resistance to staining during anneal. and demulsibility in reclaiming operations.

8660 Picking the Best Soluble Oil for the Job. S. C. Zylstra. *Machinery*, v. 64, no. 7, Mar. 1958, p. 118-120.

Factors determining selection of optimum water-mix cutting or grinding fluid.

8661 Photoetching Produces Thin Metal Parts Without Dies. G. R. Hockmeyer. *Machinery*, v. 64, no. 7, Mar. 1958, p. 129-131.

8662 Industrial Technics Co-Ordinate Drilling Machine With Automatic Positioning. *Machinery (London)*, v. 92, Mar. 7, 1958, p. 554-558.

An accuracy of ± 0.0002-in. can be obtained. Friction is reduced to almost nil by the use of Thomson re-circulating ball bushes, which run on hardened circular guide-members.

8663* Cutting With Ceramics. Charles E. Penaz. *Northwestern Engineer*, v. 17, no. 1, Feb. 1958, p. 24 + 3 pages.

Ceramic cutting tools are superior to present day carbides because they can cut at much higher speeds, thereby reducing production costs and at the same time give equal or superior finishes. Longer tool life is possible and for most applications coolants are unnecessary. Furthermore, they can machine metal alloys which are nearly impossible to cut with other tools. The use of ceramic tools however, does present some difficulty. They are very brittle and consequently require rigid and well balanced machines to prevent chipping and failure. Also the properties of the ceramic tools made by the various manufacturers differ considerably. The hardness of Al_2O_3 is 3000 on the Vickers' Hardness Scale, compared to 2400 for tungsten carbide. In addition to higher temperature hardness and strength, ceramics in general have good wear resistance, making them particularly useful for light finishing cuts at high speeds.

8664 The Rolling of Strip, Sheet and Plate. Eustace C. Larke. 404 pp. 1957. Chapman and Hall, Ltd., London. (TS340 L32r)

A compilation of information from the metal rolling literature, with emphasis on the practical application of the findings of original research work. Descriptions of modern rolling plants are included.

8665 Enamel Glasses as Lubricants for Forming Sheet Metal. A. Hegarty. *Scientific Lubrication*, v. 10, Feb. 1958, p. 12 + 2 pages.

Ceramic lubricants were used successfully in deep drawing operations with heated dies and in hammer forming using either cold or heated dies and cold punches. They provide protection from oxidation during forming.

8666 Fourslide Press or Progressive Die? J. H. v.d. Burgt. *Sheet Metal Industries*, v. 35, Mar. 1958, p. 165-178.

A comparison of the two processes for the production of thin metal parts.

8667 (German.) Design and Operational Results of a Modern Continuous Mill Train Rolling Medium Strip. **Aufbau und Betriebsergebnisse einer neuzeitlichen kontinuierlichen Mittelbandstrasse.** Herbert Severing. *Stahl und Eisen*, v. 78, no. 4, Feb. 20, 1958, p. 205-214.

The old mill performance as the basis for planning. Requirements to be met by the new train. Drives, loop lifters, coilers, and auxiliary equipment. Importance of the water supply system. Telecommunication system. Rolling schedule, performance, and allowances. Heat and power consumption.

8668* (Russian.) Determination of Width Increase in Rolling. **Opredelenie ushireniia pri prokatke.** M. V. Shuralev and S. G. Nekrasov. *Stal'*, v. 18, no. 1, Jan. 1958, p. 57-60.

Simple empirical formula for calculating the width increase which takes place in shape rolling.

8669* (Russian.) Fusion of Flakes in Alloy Steel During Rolling. **Zavarivaemost' flokenov v legirovannoi stali pri prokatke.** I. N. Golikov and B. M. Litvinov. *Stal'*, v. 18, no. 1, Jan. 1958, p. 67-70.

Investigation of conditions for fusing of lateral and longitudinal flakes during rolling, which simplify the treatment of flake-sensitive steels in rolling mills. The lateral flakes up to 25 mm. size in a 125-140 mm. square billet, weld together when the billet is rolled into 40 x 40 mm. cross section bars. Thus the minimum reduction coefficient necessary for the fusion of such flakes should be 10-12.

8670 Control to 50 Millionths. *Steel*, v. 142, Mar. 24, 1958, p. 110.

A magnetic field shrinks and swells a steel bar to produce minute increments of feed on centerless grinders.

8671* (Czech.) Fine Forging, a New Method of Forming. **Jemné kovánínová metoda tváření.** K. Ottitzky. *Strojírenská Výroba*, v. 6, no. 1, Jan. 1958, p. 15-20.

Solution of the problems of fine forging of cylindrical parts with a new forging mechanism which permits building of forging machines with maximum pressure of 360 tons, with 400 to 600 impacts per min., greater precision and other advantages.

8672 (Czech.) Investigation of Cutting Properties of Tools Provided With Ceramic Plates. **Vyzkum reznych vlastnosti soustruzníckych nozu s keramickymi destickami.** A. I. Isajev and O. M. Kirillova. *Strojírenství*, v. 8, no. 1, Jan. 1958, p. 47-53.

8673 (Czech.) Cutting Properties of Czechoslovak and Foreign Ceramic Materials and Methods of Fastening Them. **Řezivost našich a zahraničních keramických materiálů a způsoby jejich upínání.** Z. Turek and F. Vintner. *Strojírenství*, v. 8, no. 2, Feb. 1958, p. 113-118.

Comparison of cutting properties of Czech and foreign ceramic tips. Describes ways for fastening ceramic tips in steel tool holders.

8674* (Russian.) Arc-Air Metal Cutting. **Vozdushno-dugovaia rezka metallov.** K. V. Vasil'ev and I. S. Shapiro. *Svarochnoe Proizvodstvo*, 1958, no. 2, Feb., p. 22-25.

New efficient method for cutting and gaging of ferrous and nonferrous metals. Design and applicability of the arc-air cutting device consisting of a cutter, electrode, and air current. The angle of inclination between the electrode and groove should be maintained from 25 to 45°. Advantages of this method are: obtaining cut surface of higher quality, higher economy, and absence of air pollution during cutting.

8675 (Dutch.) Grinding. **Malen.** J. De Vries. *T.N.O.-Nieuws*, v. 13, no. 143, Feb. 1958, p. 61-63.

The problem of size in the grinding process. Choice of the grinding apparatus as a function of the hardness, toughness, viscosity, melting temperature, structure, weight, and water content of material. Classification of grinders.

8676* Powder Metal Shanks Reduce Chatter. C. G. Erickson. *Tool Engineer*, v. 40, Mar. 1958, p. 107-109.

The damping properties of powder-metal shank materials are being utilized to effectively reduce damaging vibration forces. Use of carbide tipped boring bars, using this shank material, resulted in improved surface finish under conditions of increased feeds, speeds, and depth of cut. The powder-metal shank is a hot-pressed sintered tungsten-base alloy with high rigidity and good damping characteristics.

8677* Machinability Can Be Related to Composition. F. W. Boulger and H. J. Grover. *Tool Engineer*, v. 40, Mar. 1958, p. 114-115.

SAE ratings were used in a multiple correlation analysis to learn the apparent effects of variations in chemical analysis. A definite relation between composition and machinability was observed.

8678* Behavior of Metals Under High-Energy Loads. Thomas A. Dickinson. *Tool Engineer*, v. 40, Mar. 1958, p. 119-122.

"Explosive forming" in which metals are subjected to high-velocity impacts has made it possible to shape parts from some difficult-to-form materials in one operation without fracture.

8679* Selecting Press Drawing Lubricants. Leon Salz. *Tool Engineer*, v. 40, Mar. 1958, p. 123-126.

A guide to the selection of correct lubricants for all types of stamping and drawing operations. Characteristics of various lubricants are discussed.

8680 Case Histories Demonstrate How Live Roller Bearing Pilot Bushings Hold Tolerances and Cut Costs. Philip F. Donley. *Tooling & Production*, v. 23, no. 12, Mar. 1958, p. 65-67.

This type of bushing has qualifications that are considered ideal for pilot bushings, which are: free running, lubricated, low in operating temperature, and free from bushing wear.

8681* (Russian.) Some Particulars on Pressing of Beryllium, Zirconium, Uranium, and Thorium. **Osobennosti pressovaniia berilliia, tsirkoniia, urana i toriia.** I. L. Perlin, V. A. Fedorchenko, and N. M. Bogorad. *Tsvetnye Metally*, v. 31, no. 2, Feb. 1958, p. 68-76.

Beryllium was pressed "warm" at 450 C, and "hot" in the range of 900 to 1000 C. The recommended pressing temperature for Zr is 730-800 C. Since U at $>$ 735 C forms alloys with Fe, Ni, and other metals, special die liners are recommended. Thorium has high pressing temperatures from 500 to 1000 C.

8682* (German.) The Rolling of Continuous Welded Wire Bars. **Das Auswalzen "endlos" zusammengeschweisster Knüppel.** A. E. Lendl and R. Preissler. *VDI Zeitschrift*, v. 100, no. 5, Feb. 11, 1958, p. 165-171.

Difficulties experienced in broaching continuous wire bars. Possibility of decreasing the diameter of the broaching cavity. Price comparison between usual and continuous wire bars. Metallographic examination of the material before and after welding.

8683* (Russian.) The Quality of the Surface Layer of Cast Iron After Electromechanical Planning. **Kachestvo poverknosnogo sloia chuguna posle elektromekhanicheskogo sglazhivaniia.** B. M. Askinazi and V. G. Alekseev. *Vestnik Mashinostroeniia*, v. 38, no. 2, Feb. 1958, p. 59-61.

The hardness of the steel studied was 200 H_B and its chemical composition; 3.22% C, 1.87% Si; 0.52% Mn, 0.18% P, and 0.5% Cr. Voltage, pressure of the planing blade, rate of cutting and feeding, and quality of the preliminary machining are considered.

8684 Mechanical Descaling and Drawing of Mild Steel Rod. L. Marsden. *Wire and Wire Products*, v. 33, Mar. 1958, p. 298 + 6 pages.

8685* (German.) Microradiographic Study of the Rolling Process. **Mikroradiographische Studien zum Walzvorgang.** Friedrich Erdmann-Jesnitzer and Fritz Günther. *Zeitschrift für Metallkunde*, v. 49, no. 1, Jan. 1958, p. 9-16.

Orientation in rolling direction and the destruction of Al_3Fe and Al_3Ni inclusions in Al alloys is studied by microradiography. Destruction of the compounds is observed as a function of initial position and degree of rolling.

8686* (German.) Transient Creep in Cubic Face-Centered Metal Crystals. **Das Übergangskriechen in kubisch flächenzentrierten Metallkristallen.** Hubert Blank. *Zeitschrift für Metallkunde*, v. 49, no. 1, Jan. 1958, p. 27-39.

Transient creep in single crystals of Al, Cu, and Ni was studied at and above room temperature, by the method of load increments. An apparatus based on optical interferences was used for measuring creep rate.

8687* (German.) Resistance to Upsetting of Zinc and Zinc Alloys. **Der Stauchwiderstand von Zink und Zinklegierungen.** Erich Pelzel. *Zeitschrift für Metallkunde*, v. 49, no. 1, Jan. 1958, p. 47-52.

Resistance to upsetting depends on orientation of the crystallites. Additions forming solid solutions with Zn increase deformation resistance much more than only by concentration.

See also: **8170** (servo controlled cam milling machine); **8176** (toroidal transformers in machine tool control); **8178** (automatic steel strip control); **8324** (flame cutting of mild steel); **8564** (press forging of Al and Mg castings); **8611** (friction and compression between flat dies); **8698** (rolling texture of Fe-Ni alloy).

METALS—METALLOGRAPHY, TRANSFORMATIONS, AND STRUCTURES

8688 Grain-Boundary Segregation of Phosphorus in an Iron-Phosphorus Alloy and the Effect Upon Mechanical Properties. M. C. Inman and H. R. Tipler. *Acta Metallurgica*, v. 6, Feb. 1958, p. 73-84.

Radioactive tracer studies show that P concentration in the grain-boundary region can be 50 times as great as the grain interior concentration, the disordered grain-boundary layer may be thicker than hitherto supposed, and the degree of intergranular failure is related to the amount of P within a grain-boundary layer about 1000 Å thick.

8689 Self-Diffusion in Dilute Binary Solid Solutions. III. Diffusion in Silver Germanium and Silver Thallium Solutions. R. E. Hoffman. *Acta Metallurgica*, v. 6, Feb. 1958, p. 95-97.

8690 The Orientation Relationships of the Low Temperature Martensite Transformation in Metastable β-Brass. R. D. Garwood and D. Hull. *Acta Metallurgica*, v. 6, Feb. 1958, p. 98-102.

A Laue method was used to determine the lattice orientation relationship between the martensite and the parent body-centered cubic phase in meta-stable β-brass.

8691 Growth of Whiskers in the Solid Phase. J. Franks. *Acta Metallurgica*, v. 6, Feb. 1958, p. 103-109.

A model has been developed which explains the known properties of whiskers. General extrusion must be inhibited for whisker growth to occur. If whiskers are removed after they have reached their terminal length, whiskers may grow subsequently on the same sites.

8692* (Russian.) The Organization of Triple Alloys as a Cooperative Phenomenon. **Uporiadochenie troinykh splavov, kak kooperativnoe iavlenie.** O. Mdivani. *Acta Physica Polonica*, v. 16, no. 6, 1957, p. 415-421.

Reduction of the partition function of a triple alloy to an Ising partition function in the case of a linear lattice. Conclusions about triple alloys in the three-dimensional case, drawn by the matrix method under the assumption of a long-range order.

8693* (German.) Investigation of Metal Behavior at High and Low Temperatures. **Untersuchung von Metallgefügen bei hohen and niedrigen temperaturen.** Přemysl Ryš, et al. *Acta Technica*, v. 3, no. 2, 1958, p. 85-120 + 21 plates.

Importance of microscopy of metals and alloys at abnormal temperatures. Details of the thermal microscope and equipment. Results on various steels, gray and white irons, Cu, and bronze containing 6% Sn in cast and deformed states.

8694* (English.) **Contribution to the Estimation of M_s From the Composition of Steels.** J. A. Verő. *Acta Technica Academiae Scientiarum Hungaricae*, v. 19, nos. 1/2, p. 193-198.

The familiar equations attributing a linear dependence of the M_s temperature of steels from their carbon content differ distinctly from linearity according to experimental results by Greninger. A quadratic form of equation: $M_s(°C)=520-(360-50\ C).C$ is claimed to be correct from 0.1 to 1.4% C within the limits of the usual experimental error.

8695* (Russian.) Investigation of a Metallic Compound Formed in Iron-Titanium Alloys. **Issledovanie metallicheskogo soedineniia, obrazuiushchegosia v splavakh zhelezo-titan.** R. B. Golubtsova. *Akademiia Nauk SSSR, Doklady*, v. 118, no. 1, Jan. 1, 1958, p. 89-91 + 1 plate.

Composition and structure of Fe_2Ti.

8696 (Russian.) Investigation of the Process of Graphite Segregation on the Surface of Fe-C Alloys During Thermal Treatment in a Vacuum. **Issledovanie protsessa vydeleniia graphita na poverkhnosti Fe-C splavov pri termoobrabotke v vakuume.** I. I. Piasetskii. *Akademiia Nauk Ukrains'koi RSR, Dopovidi*, 1958, no. 2, p. 139-143.

Behavior of the surface of steel samples in a vacuum in relation to its composition and the rate of cooling. Changes in the surface of pre-eutectic white iron during crystallization, cooling, and isothermal treatment.

8697* (Italian.) The Structure of Anodic Oxide Coatings on Aluminum. **Struttura degli strati di ossido anodico di alluminio.** M. Paganelli. *Alluminio*, v. 27, no. 1, 1958, p. 3-12.

Coatings were examined by three different test methods using an electron microscope. Results confirmed the validity of the structure scheme of Keller, Hunter, and Robinson according to which the porous coatings have a cell structure.

8698* (German.) Rolling and Recrystallization Textures of an Iron-Nickel Alloy With 30% Ni. **Walz- und Rekristallisationstexturen einer Eisen-Nickel-Legierung mit 30% Ni.** Johanna Grewen, Armin Segmüller, and Günter Wassermann. *Archiv für das Eisenhüttenwesen*, v. 29, no. 2, Feb. 1958, p. 119-124.

Relationship between texture and the temperature and duration of annealing; occurrence of cubic and intermediate and double-spinel structures.

8699* (German.) The Three-Component System Iron-Phosphorus-Zirconium. **Über das Dreistoffsystem Eisen-Phosphor-Zirkon.** Rudolf Vogel and Raimond Dobbener. *Archiv für das Eisenhüttenwesen*, v. 29, no. 2, Feb. 1958, p. 129-138.

The ideal phase diagram; thermal, chemical, and microscopic tests within the area Fe-FeP-ZrP_2-Zr.

8700* (Russian.) Study of Structural Changes Taking Place in Uranium-Molybdenum Alloys Effected by Neutron Irradiation. **Issledovanie strukturnykh ismenenii proiskhodiashchikh v splave urana s molibdenom pod deistviem neitronnogo oblucheniia.** S. T. Konobeevskii, et al. *Atomnaia Energiia*, v. 4, no. 1, Jan. 1958, p. 34-44.

Neutron irradiation of U-Mo(9 wt.%) alloy with subsequent measurement of electric resistance and investigation of the structure by X-ray and microscopic analysis establishes that the diffusion velocity in annealed specimens being subjected to irradiation is proportional to the square of the grain size. Disorder phenomena occur in the γ-phase.

8701* (Russian.) The Fine Structure and Its Effect on the Notch Impact Strength of Welded Seams. **Tonkaia struktura i ee vliianie na udarnuiu viazkost' svarnykh shvov.** B. S. Kasatkin, N. L. Kareta, and G. F. Darovskii. *Avtomaticheskaia Svarka*, v. 11, no. 2, Feb. 1958, p. 20-29.

An electron-microscope investigation of the fine-grained structure of low-carbon and low-alloy welded seams.

8702* (Russian.) The Electron-Microscopic Analysis of Welded Seams in Titanium. **Elektronno-mikroskopicheskoe issledovanie svarnykh shvov titana.** V. F. Grabin and S. M. Gurevich. *Avtomaticheskaia Svarka*, v. 11, no. 2, Feb. 1958, p. 37-41.

Shows the effect of additions, such as N, O, H, and C, on the fine-grained structure of the seam-metal.

8703* (German.) New Facts About the Solidification Processes in Steel Ingots and the Occurrence of the Liquation Phenomena. **Neuere Erkenntnisse über den Ablauf der Erstarrungsvorgänge bei Stahlblöcken und die Entstehung der Seigerungserscheinungen.** Bernhard Matuschka. *Berg- und Hüttenmännische Monatshefte der Montanistischen Hochchule in Leoben*, v. 103, no. 1, Jan. 1958, p. 1-12.

Contraction of volume; the rate of solidification; solidification as a function of time and superheat temperature; possibilities for accelerating the solidification process.

8704* (French.) Formation of Annealing Graphite in Steel and White Cast Iron. **La formation du graphite de recuit dans les aciers et les fontes blanches.** Jacques Pomey, Robert Lafont, and Louis Abel. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences*, v. 246, no. 7, Feb. 17, 1958, p. 1044-1046 + 1 plate.

In extra-hard steels subjected to quenching, tempering, and graphitizing annealing, each martensite platelet can give a single crystal graphite platelet. The activation energy of the graphite growth seems to be that of the Fe self diffusion in both α and γ states.

8705* (French.) Autoradiographic Determination of Preferential Self Diffusion in the Sub-Boundaries of α-Iron Polygonization. **Mise en évidence par autoradiographie de l'autodiffusion préférentielle dans les sous-joints de polygonisation du fer α.** Pierre Coulomb, Claude Leymonie, and Paul Lacombe. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences*, v. 246, no. 8, Feb. 24, 1958, p. 1209-1212.

The grain boundary lattice and a fine intragranular lattice were revealed by autoradiography of a polycrystalline sample of pure Fe into which some radioactive Fe was diffused at 700 C.

8706* (French.) Autoradiographic and Micrographic Detection of Original Gamma Phases of Iron. **Sur la détection autoradiographique et micrographique d'anciens joints γ du fer.** Pierre Coulomb. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences*, v. 246, no. 9, Mar. 3, 1958, p. 1421-1424.

Original γ-phases can be revealed by a chemical or thermal reaction, or by intergranular self-diffusion. Comparison of the lattices reveals a similar effect of the geometrical parameters on the segregation of impurities and on intergranular self-diffusion.

8707 The Constitution of the System Indium–Thallium–Lead, With Reference to Structural Transformations. G. V. Raynor and J. Graham. *Faraday Society, Transactions*, v. 54, pt. 2, Feb. 1958, p. 161-173.

8708* (Russian.) Determining the Atomic Density Distribution in Molten Al and Bi at Different Temperatures From Electronographic Data. **Opredelenie plotnosti raspredeleniia atomov v zhidkikh Al and Bi pri razlichnykh temperaturakh po dannym elektronogramm.** A. I. Bublik and A. G. Buntar'. *Fizika Metallov i Metallovedenie*, v. 5, no. 1, 1957, p. 53-57.

Study of electron scattering intensity by molten Al at 670, 720, and 850 C and by molten Bi at 280, 300, and 400 C.

8709* (Russian.) Theory of the Diffusion Scattering of X-Rays by Triple Alloys. **Teoriia diffuznogo rasseianiia rentgenovykh luchei troinymi splavami.** M. A. Krivoglaz. *Fizika Metallov i Metallovedenie*, v. 5, no. 2, 1957, p. 203-211.

Formulas determining the dependence of scattering intensity of the monochromatic emission of single-crystal on the scattering angle, orientation of single-crystal, alloy composition, annealing temperature, and interaction between the atoms are presented.

8710* (Russian.) The Study of Electrolytic Transfer of a Carbon in Steel by the Radiotracer Method. **Izuchenie elektroliticheskogo perenosa ugleroda v stali metodom radioaktivnykh indikatorov.** Iu. F. Babikova and P. L. Gruzin. *Fizika Metallov i Metallovedenie*, v. 5, no. 2, 1957, p. 255-260.

Determining the transfer of C in α-iron by means of C^{14} in an electric field at different temperatures shows that C atoms in ferrite are present in the form of cations.

8711* (Russian.) Distribution of Alloying Elements in Austenitic Chrome-Tungsten Steels and Alloys With Variable Nickel Content. **Raspredelenie legiruiushchikh elementov v austenitnykh khromovol'framovykh staliakh i splavakh s peremennym soderzhaniem nikelia.** N. F. Lashko and E. Ia. Rodina. *Fizika Metallov i Metallovedenie*, v. 5, no. 2, 1957, p. 261-267.

Analyses of phases of austenite steels and alloys containing from 20 to 60% of Ni, W, V, and Nb. The increase of Ni in steels and alloys decreases the solubility of C, changing along with it the composition of solid solution, composition of phases, and their heat-resisting properties.

8712* (Russian.) Condition of the Surface of a Zn Single-Crystal After Polishing and Annealing. **Sostoianie poverkhnostnogo sloia monokristalla tsinka posle shlifovki i otzhiga.** I. A. Gindin and V. S. Kogan. *Fizika Metallov i Metallovedenie*, v. 5, no. 2, 1957, p. 326-330.

Study performed at room and at liquid N temperatures, revealed that the surface of a mono-crystal breaks down into small grains, disoriented more extensively when cold hardening was performed in liquid N.

8713* (French.) Considerations on the Solidification Mechanism in Gray Cast Iron. **Considérations sur le mécanisme de la solidification des fontes grises.** Albert De Sy. *Fonderie Belge*, 1958, no. 2, Feb., p. 43-51.

Value of knowledge of the mechanism of metallurgical transformations. Spontaneous nucleus formation. The mechanism of eutectic crystallization and its differences in normal and abnormal eutectics.

8714* (Czech.) Graphitization of Pearlitic Cementite in Spheroidal Graphite Cast Iron at Hypoeutectoid Temperatures. **Grafitisace perlitického cementitu tvárné litiny za podeutektoidních teplot.** Stanislav Drápal. *Hutnické Listy*, v. 13, no. 1, Jan. 1958, p. 42-49.

Study of the decomposition of pearlitic cementite in cast iron. Spheroidization and coagulation of cementite first occur at hypoeutectoid temperatures. Graphitization does not appear more pronounced until the end of a certain time period, the length of which increases with increasing Cr content, decreasing temperature, and diminishing Si content.

8715 Intragranular Substructures in High-Purity Nickel. Paul Feltham. *Institute of Metals, Journal*, v. 86, pt. 5, Jan. 1958, p. 237-240.

A technique for developing dislocation etch pits in Ni is described. In specimens annealed at 850-900 C, the formation of a cell structure and its mesh size is observed; the density of etch pits delineating it is approximated.

8716 The Age-Hardening Mechanism in Magnesium-Lithium-Zinc Alloys. J. B. Clark and L. Sturkey. *Institute of Metals, Journal*, v. 86, pt. 6, Feb. 1958, p. 272-276.

8717 Interaction Between Slip Bands and Particles of Precipitate in an Aluminium Alloy. Shigeyasu Koda and Taro Takeyama. *Institute of Metals, Journal*, v. 86, pt. 6, Feb. 1958, p. 277-280.

The phenomena of slip in a heat-treated Al-4% Cu alloy were studied by electron micrography. The alloy had been aged at 250 C to a point just beyond the hardness maximum and contained platelets of the coherent θ' phase in a well-defined Widmanstätten pattern. Slip bands were short and of the lamellar type and platelets in their path were bent.

8718 The Isothermal Transformation of Spheroidized Pearlite to Austenite. A. A. Golestaneh, C. Handford, and G. Bullock. *Iron and Steel Institute, Journal*, v. 188, pt. 3, Mar. 1958, p. 237-241.

An electrical resistance technique for studying the transformation in a plain carbon eutectoid steel at supercritical temperatures. The incubation time appears to be a function of ferrite/cementite interfacial area, and for comparable values spheroidized pearlite was found to begin transforming more quickly than lamellar pearlite.

8719 The Solubility of Nitrogen in Iron-Chromium Alloys. E. T. Turkdogan and S. Ignatowicz. *Iron and Steel Institute, Journal*, v. 188, pt. 3, Mar. 1958, p. 242-247.

Chromium increases the solubility of N in γ, α, and liquid iron. The heat and entropy of solution of N in the γ-phase decreases with increasing concentration of Cr. The nitride formed at 600 C is CrN. Dissolved N increases the stability range of the γ-phase.

8720 Arrangements of Dislocations in Plastically Bent Silicon Crystals. J. R. Patel. *Journal of Applied Physics*, v. 29, Feb. 1958, p. 170-176.

8721 Thermally Precipitated Phases and Their Distribution in an Aluminum-Silicon-Cadmium Alloy. R. E. Marburger and A. W. Schluchter. *Journal of Applied Physics*, v. 29, Feb. 1958, p. 184-188.

X-ray and electron diffraction and electron microscopy were used to study the composition and distribution of the precipitated phases in an Al-4% Si-1% Cd alloy as a function of thermal history. A correlation exists between the precipitated minor phases and the "score resistance" of bearings made of the alloy.

8722 X-Ray Study of Cold Work in Molybdenum. J. Despujols and B. E. Warren. *Journal of Applied Physics*,, v. 29, Feb. 1958, p. 195-197.

Satisfactory peak shapes for 110, 200, 211, 220, and 310 were obtained with filtered CuKα. Peak shapes for 400 and 422 obtained with filtered MoKα were not satisfactory, partly because of fluorescence radiation. Peaks were recorded with a Norelco diffractometer and instrumental broadening corrected by the Stokes method. The Fourier coefficients indicate approximately isotropic incoherent domains L=260 A and strains inversely as Young's modulus. Molybdenum is similar to W in that there is no evidence for faulting on (211) as a result of cold work.

8723* (German.) Grain Refinement of Al-Al_3Fe Eutectic. **Die Veredlung des Al - Al_3Fe - Eutektikums.** H. Spengler. *Metall*, v. 12, no. 3, Mar. 1958, p. 201-204.

Processes of rapid cooling, overheating, and addition of Na, Mg, Ca, Sr, Cr, Mn, Ni, Pb, Th, Cd, and Bi.

8724 (Russian.) Recrystallization of Low-Carbon Steel on Rapid Induction Heating. **Rekristallizatsiia malouglerodistoi stali pri bystrom induktsionnom nagreve.** B. A. Kuznetsov. *Metallovedenie i Obrabotka Metallov*, 1958, no. 2, Feb., p. 28-35.

Explanation of some features of the recrystallization process in "08" steel (0.12% C; 0.31% Mn; 0.028% S; 0.012% P; trace of Si) during rapid induction heating and determination of the effect of various factors, (such as heating rate, temperature of heating, cooling rate, etc.) on properties of the annealed steel.

8725 An X-Ray Diffraction Technique for Quantitative Determination of Texture Variation in Drawn Rods of Cubic Metals. D. S. Eppelsheimer and K. K. Tangri. *Missouri. University. School of Mines and Metallurgy, Bulletin. Technical Series No.* 87, 1957, 8 pp. (QE131 M69.85t Vis.)

A special specimen mount was designed for this purpose.

8726* Some Structural Considerations in Nodular Iron. Verne Pulsifer. *Modern Castings*, v. 33, Mar. 1958, p. 46-48.

The solidification process is described with the proposal that nodules form near the liquidus in a normal nucleation process rather than near or below the solidus.

8727 (English.) **Precipitation of Nickel and Copper From Supersaturated Solutions in Germanium.** P. Penning. *Philips Research Reports*, v. 13, Feb. 1958, p. 17-36.

The behavior of Cu and Ni atoms in Ge near 500 C.

8728 X-Ray Study of Deuteron-Irradiated Copper Near 10°K. R. O. Simmons and R. W. Balluffi. *Physical Review*, v. 109, ser. 2, no. 4, Feb. 15, 1958, p. 1142-1152.

Precise measurements of lattice expansion of high-purity Cu held near 10 K during bombardment were made using a rotating single-crystal method. An expansion of $(4.1 \pm 0.2) \times 10^{-21}$ per 7 Mev deuteron/cm^2 was found.

8729* (English.) **Study on the Ordered Alloy Ag_3Mg.** Kunio Fujiwara, Makoto Hirabayashi, Denjiro Watanabe, and Shiro Ogawa. *Physical Society of Japan, Journal*, v. 13, no. 2, Feb. 1958, p. 167-174.

One-dimensional anti-phase domain structure was confirmed by X-ray diffraction study using a single crystal as well as polycrystals and by electron diffraction study with evaporated thin films. Specific heat and electrical resistivity were measured.

8730* (German.) Silicoborides of the Transition Metals Vanadium, Niobium, Tantalum, Molybdenum and Tungsten. **Silicoboride der Übergangsmetalle Vanadin, Niob, Tantal, Molybdän und Wolfram.** H. Nowotny, R. Kieffer, and F. Benesovky. *Planseeberichte für Pulvermetallurgie*, v. 5, no. 3, Dec. 1957, p. 86-93.

A radiographic, microscopic, and thermodynamic study, with the help of sintered and arc-melted specimens, was made of the ternary systems of Mo, W, V, Nb, and Ta with Si or B. In the range above 60 At.% of metal, the systems are characterized by a ternary crystal type having a T2 structure (Cr_5B_3-type) with approximately the following formulas: Mo_5SiB_2, $W_5Si_3B_2$, and V_5SiB_2. The T2 phase occurs on the line connecting the tetragonal M_5Si_3 phases (T1) and the M_5B_3 compositions. The lower B contents appear when the number of the period decreases.

8731 Practical Microscopical Metallography. Richard Henry Greaves and Harold Wrighton. 4th Ed. 221 pp. 1957. Chapman & Hall, Ltd., London. (TN690 G79p4)

Deals with methods and results of the examination of metals and alloys with an optical microscope. Structures of metals and alloys of industrial importance are considered in detail in the light of their constitution, but with special reference to their mechanical properties and practical utility.

8732* (German.) Grain Boundaries in Technically Prepared Metal Materials. **Korngrenzen in technisch hergestellten metallischen Werkstoffen.** H. K. Görlich. *Radex Rundschau*, 1958, no. 1, Jan., p. 31-35.

General considerations regarding the formation of boundaries during the crystallizing process; possibility of intercrystalline deposits of foreign substances in the disturbed peripheral regions.

8733 The Transition Temperature of the Transition Between Grey and White Tin. G. V. Raynor and R. W. Smith. *Royal Society, Proceedings*, v. 244, ser. A, Feb. 25, 1958, p. 101-109.

Systematic experiments, using a sensitive dilatometric technique, were carried out on the transformation temperatures of two samples of metallic tin and of a number of dilute tin-rich alloys.

8734 Factors Controlling the Grain Size of 5 Per Cent Chromium Hot Work Die Steels. I. R. F. Harvey and C. T. Fletcher. *Steel Processing and Conversion*, v. 44, Mar. 1958, p. 129 + 8 pages.

Effect of austenitizing time and temperature, composition, forging conditions, and annealing conditions. (To be continued.)

8735* (Russian.) Structural Non-Uniformity of Welded Joints. **O strukturnoi neodnorodnosti svarnykh shvov.** B. S. Kasatkin and A. A. Rossoshinskii. *Svarochnoe Proizvodstvo*, 1958, no. 1, Jan., p. 6-8.

Investigates the effects of conditions of crystallization on the properties of various joint sections. Results show that the conditions of crystallization affect the degree of non-uniformity and the magnitude of inner stresses.

8736* (English.) **Ferromagnetic Domain Structure as Affected by the Uniaxial Anisotropy Induced in a 40 Percent Co-Ni Single Crystal.** Mikio Yamamoto, Satoshi Taniguchi, and Keizô Aoyagi. *Tôhoku University, Science Reports of the Research Institutes, Ser. A. Physics, Chemistry, Metallurgy*, v. 10, no. 1, Feb. 1958, p. 20-33.

Perminvar-type magnetic properties are due to the stabilization of domain walls by the induced uniaxial anisotropy in f.c.c. solid solutions with cubic anisotropy constants of any sign, and b.c.c. solid solutions with negative cubic anisotropy constants.

8737 Metallography of Irradiated UO_2-Containing Fuel Elements. W. K. Barney and B. D. Wemple. *U. S. Atomic Energy Commission, KAPL-1836*, Jan. 15, 1958, 43 pp. (UF767 Un3.1ka Contin.)

Hot laboratory metallography and techniques for examining fuel elements that contain UO_2 after irradiation to high burnups. Some unusual irradiation characteristics of UO_2.

8738 Effects of Various Preferred Orientations on the Dimensional Stability of Uranium. O. K. Shupe, W. V. Cummings, and E. C. Watts. *U. S. Atomic Energy Commission, HW-54605*, Jan. 20, 1958, 22 pp. (UF767 Un3.1hw Contin.)

Dimensional stability of polycrystalline uranium during irradiation is influenced not only by single preferred orientations of the crystallites, but also by combinations of two preferred orientations. Rate of growth during irradiation increases approximately exponentially with the initial magnitude of the (010) texture.

8739 Intermediate Phases in the Iron-Tungsten and Cobalt-Tungsten Binary Systems. Edward C. Van Reuth. *U. S. Air Force. Wright Air Development Center. WADC Technical Report* 57-717, Dec. 1957, 23 pp. (TL507 Un3.18w Vis.)

Neither system contains a σ phase. A ξ phase (M_6W_6) forms directly from the liquid, precluding the formation of the σ phase.

8740* (Russian.) Electropolishing and Electroetching of Metallographic Specimens Made From Metalloceramic Materials Based on Iron and Copper. **Elektropolirovka i elektrotravlenie metallograficheskikh shlifov iz metallokeramicheskikh materialov na osnove zheleza i medi.** O. K. Teodorovich and E. T. Kachkovskaia. *Zavodskaia Laboratoriia*, v. 24, no. 1, 1958, p. 57-60.

Method and equipment for obtaining high quality microsections of both porous and non-porous metalloceramic compositions.

8741* (Russian.) Electrolytic Deposition of Martensite and Austenite From Tempered Steel. **Elektrolitícheskoe vydelenie martensita i austenita iz zakalennoi stali.** V. D. Zelenova. *Zavodskaia Laboratoriia*, v. 24, no. 1, 1958, p. 60-62.

Study of separation conditions from U10, U12, and U13 steels subjected to anodic dissolution in 1 *N* KCl + 0.5% citric acid as electrolyte.

8742* (German.) Observing the Disintegration of Metal Crystallites. **Beobachtungen von Abbauerscheinungen an Metallkristalliten.** Ernst Brüche and Helmut Poppa. *Zeitschrift für Metallkunde*, v. 49, no. 1, Jan. 1958, p. 17-21.

The results of Kossel and coworkers suggesting regular "lattices" also below the light-optical resolving power are confirmed. Lattices with lattice constants between 0.05μ (brass) and 0.3μ (copper) were observed. Thus a connection is given between the light-optical and ring structures obtained from field-emission-microscopic studies.

8743* (German.) The Constitutional Diagrams of Gallium-Cadmium and Gallium-Zinc. **Die Zustandsbilder von Gallium-Kadmium und Gallium-Zink.** Theo Heumann and Bruno Predel. *Zeitschrift für Metallkunde*, v. 49, no. 2, Feb. 1958, p. 90-95.

The equilibrium diagrams are checked by differential thermal analysis. The limits of the solid solution are determined by X-ray and hardness measurements.

8744* (Russian.) A Study of the Sorption of Some Cations by Metallic Germanium With the Aid of Radioactive Indicators. **Izuchenie sorbtsii nekotorykh kationov metallicheskim germaniem pri pomoshchi radioaktivnykh indikatorov.** I. M. Kuleshov and A. F. Naumova. *Zhurnal Fizicheskoi Khimii*, v. 32, no. 1, Jan. 1958, p. 62-65.

The sorption of Na, Ca, and Fe cations takes place in the process of etching mono- and polycrystalline specimens of metallic Ge. In 28% H_2O_2 solution the magnitude of sorption is similar for the different cations, equalling 10^{-6} to 10^{-5} g. ion/cm^2 of the Ge surface.

See also: **7905** (coefficient of hydrogen diffusion in Ti); **7922** (determination of iron carbide in steels); **8162** (microstructure of hard-facing alloy); **8280** (crystal orientation of Ge and Si); **8463** (structure of Mg alloys); **8526** (equilibrium of C and O in molten Fe); **8575** (carbon concentration in austenite); **8587** (Mn in macrostructure of Al alloys); **8595** (behavior of metallic surfaces in processing); **8616** (Al-Zn system); **8640** (microstructure of M-388 Al alloy); **8650** (Pb-Sn-Bi system); **9028** (structure of Chromansil steel); **9029** (electrolytic development of welded structures).

METALS—POWDER

8745* (Czech.) Carbide Grain Growth in the Production of Carbide-Containing Hard Alloys by Means of Powder Metallurgy. **K problému růstu karbidových zrn při výrobě tvrdých karbidických slitin práškovou metalurgií. I.** The Dependence of Grain Growth on the Temperature and the Time of Sintering. **Závislost růstu zrn na teplote a dobe slinování. II.** The Influence of Alloying Carbides on the Process of Grain Growth. **Vliv prisadnich karbidu na pochod rustu zrna.** Bohuslav Čech. *Hutnické Listy*, v. 13, no. 2, Feb. 1958, p. 113-123.

Influence of the size of carbide grains on properties of carbide hard alloys. Relationship between the size of coarsest carbide grains and temperature and time of heating. Solution and precipitation kinetics are the prevailing factors in the growth of carbide grains. Modifications of the structure of Cr_3C_2-Ni alloys during long-time sintering at 1320 C with the presence of additions of WC, TiC, Mo_2C, TaC, NbC, and VC in a quantity of 5% by volume. The growth of Cr_3C_2 grains is most effectively inhibited by an addition of WC.

8746 The Production and Uses of Aluminium Powder and Paste. V. J. Hill. *Metallurgia*, v. 57, no. 340, Feb. 1958, p. 75-78.

Methods of producing Al powder; properties and applications of both granular and flake forms, with reference to the effect of flake size and shape, and of the choice of vehicle on the characteristics of Al paints.

8747* (German.) Studies on the Stages of Sintering and on Recrystallization Phenomena. **Untersuchungen zum Sinterverlauf und von Rekristallisationsvorgängen.** W. Rutkowski. *Neue Hütte*, v. 3, no. 1, Jan. 1958, p. 37-43.

Examination of the sintering process at the interface of a Cu and Fe or W powder layer of pressed specimens as function of the sintering time and oxide contents. Recrystallization of pure Ag with addition of small W impurities.

8748* (Norwegian.) Direct Observation of the Sintering Process Tested With High Temperature Metallography. **Forsok pa direkte observasjon av sintringsprosessen ved hjelp av hoytemperaturmetallografi.** Edgar Bull Simonsen. *Tidsskrift for Kjemi, Bergvesen og Metallurgi*, v. 18, no. 1, 1958, p. 9-13.

A reflection microscope was used to observe the surface modifications of pressed Cu powder compacts during sintering.

8749* (German.) Synthetic Solids. **Synthetische Festkörper. XIII.** The Effect of Surface Layers, Especially Oxide Layers on the Sintering of Metals. **Über den Einfluss von Oberflächenschichten, insbesondere Oxydschichten, auf das Sintern von Metallen.** Martin Clasing. *Zeitschrift für Metallkunde*, v. 49, no. 2, Feb. 1958, p. 69-75.

The tensile strength, fracture strain, hardness, and density of sintered specimens are investigated as a function of preoxidation and grain size of the powder, sintering temperature, and sintering time.

See also: **8676** (powder-metal tool shank); **8730** (transition-metal silicoborides).

NONDESTRUCTIVE TESTING AND QUALITY CONTROL

8750* (Dutch.) Nondestructive Moisture Determination. Radioactive Method With Fast Neutrons. **Nietdestructive vochtigheidsbepaling. Radioactieve metode met snelle neutronen.** J. G. R. van Dijck. *Bedrijf en Technik*, v. 13, no. 300, Mar. 8, 1958, p. 35 + 2 pages.

Principle of the radioactive method; formation of slow neutrons; formation of fast neutrons when the moisture content is high. Applications with different moisture values and in water. Industrial uses.

8751* **Weld Radiography.** *Industry & Welding*, v. 31, Mar. 1958, p. 28 + 23 pages.

Use in the shop and in the field. Selection and use of X-ray machines, γ-ray equipment, and radiographic film on a variety of materials and thicknesses.

8752 The Use of Ultrasonic Testing for the Control of Quality in the Manufacture of Aluminium Alloys and Other Non-Ferrous Materials. J. G. Harris and J. Crowther. *Institute of Metals, Journal*, v. 86, pt. 5, Jan. 1958, p. 193-206.

Characteristic defects of cast and wrought material are discussed in relation to their location and evaluation.

8753 Instrumentation in Ultrasonic Flaw Detection. D. G. W. Claydon. *Institute of Metals, Journal*, v. 86, pt. 6, Feb. 1958, p. 241-251.

Generation of ultrasonic pulses; coupling methods and probes; factors affecting assessment of defect size; electronic equipment and presentation methods; alarm and recording systems; general requirements for automatic units.

8754 Use of a Search-Coil Apparatus for Eddy-Current Testing of Copper and Its Alloys. N. B. Harvey. *Institute of Metals, Journal*, v. 86, pt. 6, Feb. 1958, p. 252-256.

8755 (English.) **Investigations on the Gamma and X Radiation of Tm-170 for Thickness Measurement Purposes.** H. N. Steiger and T. Westermark. *Kunglia Tekniska Högskolans Handlingar*, no. 118, 1957, 31 pp. (T4 K96t Vis.)

In order to form a basis for thickness control of industrial objects of thicknesses corresponding to 1–10 mm. steel by soft γ radiation, extensive absorption measurements with the γ and X radiation of Tm-170 were performed, using CH_3I filled ionization chambers as well as G. M. and scintillation detectors. Absorbers of Al, Fe, Cu, and Pb were studied and also some Fe alloys.

8756* (French.) Some New Apparatus for Continuous Nondestructive Testing of Metals. **Quelques nouveaux appareils pour le contrôle non destructif en continu des métaux.** L. Beaujard and V. Husarek. *Metaux. Corrosion-Industries*, v. 32, no. 388, Dec. 1957, p. 459-468.

Ultrasonic testing of open-hearth steel billets and sounds before rolling. New methods applied to ultrasonic and magnetic control of thin sheets.

8757* **Nondestructive Testing.** *Power*, v. 102, Mar. 1958, p. 115-138.

Currently available methods and equipment; use in manufacturing and maintenance.

8758* (Russian.) Method for Determining Magnitude of Defects in Welded Joints, by Gamma-Ray Images. **Raschetnyi metod opredeleniia velichiny defekta v svarnom soedinenii po gamma-snimku.** K. G. Goriacheva. *Svarochnoe Proizvodstvo*, 1958, no. 1, Jan., p. 12-14.

Determination of defects in an article with an accuracy sufficient for the practice (<107).

8759* (German.) Impulse-Echo Testing Method Applied to Plane-Shaped Solids. **Über Impuls-Echo-Prüfung an plattenförmigen Körpern.** Werner Grabendörfer and Josef Krautkrämer. *Zeitschrift für Metallkunde*, v. 49, no. 1, Jan. 1958, p. 22-26.

Fundamentals and application to non-destructive testing of materials. Intermediate echoes in defect-free material may arise by transverse waves which are split from the longitudinal incoming wave. Special laws are deducted for the multiple echoes.

See also: **8558** (measuring gas content of Al alloys during casting).

NUCLEAR PHYSICS, NUCLEONICS, AND RADIATION

8760* (Russian.) Approximate Dispersion Ratios for Nucleon-Nucleon Scattering. **Priblizhennye dispersionnye sootnosheniia dlia rasseianiia nuklonov na nuklonakh.** V. Z. Blank and P. S. Isaev. *Akademiia Nauk SSSR, Doklady*, v. 117, no. 5, Oct. 11, 1957, p. 785-787.

8761* (Russian.) Investigation of Scintillators Containing Boronorganic Compounds. **Issledovanie stsintilliatorov, soderzhashchikh bororganicheskie soedineniia.** A. N. Nikitina, et al. *Akademiia Nauk SSSR, Izvestiia, Seriia Fizicheskaia*, v. 22, no. 1, Jan. 1958, p. 12-13.

Ethers of the alkyl- and dialkylboron acids in *p*-terphenyl solution, leave the intensity of the γ-scintillation of the latter almost unchanged. Trimethylborate weakens the γ-scintillation by 50%.

8762* (Russian.) The Amplitudes of Impulses Obtained From Plastic Scintillators With Different Activators. **Amplitudy impul'sov ot plasticheskikh stsintilliatorov s razlichnymi aktivatorami.** M. N. Medvedev, E. N. Matveeva, and L. Ia. Zhil'tsova. *Akademiia Nauk SSSR, Izvestiia, Seriia Fizicheskaia*, v. 22, no. 1, Jan. 1958, p. 44-47.

8763* (Russian.) Damaging Plastic Scintillators by Ionizing Radiation. **Povrezhdenie plastmassovykh stsintilliatorov ioniziushchimi izlucheniiami. II.** I. M. Rozman. *Akademiia Nauk SSSR, Izvestiia, Seriia Fizicheskaia*, v. 22, no. 1, Jan. 1958, p. 60-66.

Studies scintillators made from polystyrene or *p*-terphenyl, with added 1,1',4,4'-tetraphenyl butadiene, and irradiated with α-particles of Po^{210} and β-particles of Ce^{144}-Pr^{144}.

8764* (English.) **Gamma-Gamma Angular Correlations in Ca^{48}, Hg^{200} and Pb^{206}.** Torsten Lindqvist. *Arkiv för Fysik*, v. 12, no. 6, 1957, p. 495-517.

An automatic apparatus for angular correlation measurements. Corrections for counter solid angle. Gamma-gamma angular correlation measurements determine the spins of two excited levels

in Ca^{43} and three excited levels in Hg^{200}. In Pb^{206} spins of five excited levels are verified.

8765* (English.) **Applications of a Multi-Channel Goniometer.** Torsten Lindqvist and Erik Karlsson. *Arkiv för Fysik*, v. 12, no. 6, 1957, p. 519-536.

A multi-channel goniometer for γ-γ angular correlation measurements was carefully tested with well-known correlations (Bi^{207}, Hf^{181}, and Co^{60}). As applications, the angular correlations of γ cascades from Ba^{131} and Nd^{147} were investigated.

8766* (English.) **Cross Sections for Bremsstrahlung and Pair Creation Involving Polarized Electrons and Photons.** Arne Claesson. *Arkiv för Fysik*, v. 12, no. 6, 1957, p. 569-589.

The differential cross sections for bremsstrahlung and pair creation involving arbitrarily polarized electrons and linearly and circularly polarized photons are computed.

8767* Controlled Fusion Research in France. P. Hubert. *Atomics* (British), v. 9, no. 3, Mar. 1958, p. 86-88.

French workers have attained temperatures of well over 10^6K in a toroidal discharge. Observations on deuterium indicate a high state of excitation during the brief period when visible light emission ceases.

8768* (German.) The Time Reaction of the Boiling-Water Reactor. **Über das zeitliche Verhalten des Siedewasser-Reaktors.** A. Kirchenmayer. *Atomkernenergie*, v. 3, no. 1, Jan. 1958, p. 6-10.

Equations in linear approximations are used to determine the relative change in the flow of neutrons, and the heat transfer per unit surface.

8769* (German.) The Fine Structure of Flux in the Gas-Cooled Reactor Cells. **Flussfeinstruktur in gasgekühlten Reaktorzellen.** Gerhard Riesch. *Atomkernenergie*, v. 3, no. 1, Jan. 1958, p. 16-21.

Newmarch's computations of the flow fine structure in a cylindrical cell with a central fuel bar in the gas chamber were extended to bundles of fuel elements.

8770 (German.) The Distribution of Temperature and Stress in a Cylindrical, Uncoated, Sufficiently-Long, Fuel Element. **Temperatur- und Spannungsverteilung in einem zylindrischen nicht umhüllten hinreichend langen Brennstoffelement.** Walter Hage. *Atomkernenergie*, v. 3, no. 2, Feb. 1958, p. 49-53.

8771 (Germany.) Theory of Radioactive Contamination by Atomic-Weapon Tests. **Theorie der radioaktiven Verseuchung durch Atomwaffenversuche.** K. Bechert. *Atomkernenergie*, v. 3, no. 2, Feb. 1958, p. 64-68.

Presents figures on the contamination of soil and of the human body during and after tests.

8772* (German.) Investigations of the Possibility of a Substantial Local Rise of the Neutron Flow in a Reactor. **Untersuchungen über die Möglichkeit, den Neutronenfluss in einem Reaktor örtlich wesentlich zu erhöhen.** Gerhard Locke. *Atomkernenergie*, v. 3, no. 3, Mar. 1958, p. 89-94.

Inside a reactor a chamber is built with a thermal flow larger than in the rest of the reactor. The walls are made of fissionable materials (U^{235}, Pu^{239}, etc.). The neutron flow creates a chain reaction in the chamber walls, raising the local flow in the chamber which is surrounded by a neutron absorbing layer to prevent a thermal rise of the flow outside the chamber.

8773* (Russian.) Gamma-Ray Spectra From Radioactive Neutron Capture by Even-Even Emitting Nuclides With Rotational Levels. **Spektry γ-luchei radiatsionnogo zakhvata neitronov dlia chetno-chetnykh izluchaiushchikh iader s vrashchatel'nymi urovniami.** L. V. Groshev, A. M. Demidov, V. N. Lutsenko, and V. I. Pelekhov. *Atomnaia Energiia*, v. 4, no. 1, Jan. 1958, p. 5-21.

Measurement of γ-ray spectra accompanying the capture of thermal neutrons by the nuclides of Gd, Er, Dy, and Ta in the energy range of a 3 to 20 m.e.v. by means of a magnetic Compton spectrometer. Peculiarities of these spectra and their connection with the structure of the lower level of the nuclides.

8774* (German.) Influence of the Cooling System on the Economic Feasibility of Nuclear Reactors. **Der Einfluss des Kühlsystems auf die Wirtschaftlichkeit von Kernreaktoren.** Andreas Setzwein. *Atomwirtschaft*, v. 3, no. 1, Jan. 1958, p. 6-10.

Deals with the production costs of atomic energy.

8775* (German.) Production, Properties, and Use of Reactor Graphite. **Herstellung, Eigenschaften und Anwendung von Reaktorgraphit.** F. Jeitner. *Atomwirtschaft*, v. 3, no. 1, Jan. 1958, p. 17-21.

Low atomic weight, low absorption profile for slow neutrons, and mechanical and thermal properties are decisive factors in the use of graphite in nuclear reactors.

8776 Radiochemical Analysis for Long-Lived Fission Products in Environmental Materials. W. F. Merritt. *Canadian Journal of Chemistry*, v. 36, Mar. 1958, p. 425-428.

A method is described whereby radiochemical analysis for the long-lived fission products Ru^{106}, Sr^{89}, Cs^{137}, and Ce^{144} may be performed on the same sample of soil, water, or biological material.

8777 An Interpretation of the Low-Lying Excited States of Mg^{25} and Al^{25}. A. E. Litherland, et al. *Canadian Journal of Physics*, v. 36, Mar. 1958, p. 378-404.

8778* (French.) An Ion Source With Electronic Bombardment. **Sur une source d'ions à bombardement électronique.** Daniel Blanc and André Degeilh. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences*, v. 246, no. 6, Feb. 10 1958, p. 936-939.

Properties of an ion source of the Nier type used without its auxiliary magnetic field; operation with variable pressures and accelerations. The ion yield was greater than 50μA for tensions above 8 kv. (for air).

8779* (French.) On an Extended Electron Structure. **Sur une structure étendue de l'électron.** Ernest Joachim Sternglass. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences*, v. 246, no. 8, Feb. 24, 1958, p. 1166-1168.

Experimental results relating to electron nucleon diffusion with high energies are compatible with a purely electromagnetic extended electron structure.

8780* (Russian.) Cross-Section for Inelastic Proton-Proton Interaction at Proton Energies Greater Than 7 Bev. **Sechenie neuprugogo vzaimodeistviia proton-proton pri energiiakh protonov bol'she 7 Bev.** K. I. Alekseeva and N. L. Grigorov. *Doklady Akademii Nauk SSSR*, v. 117, no. 4, Dec. 1, 1957, p. 593-596.

8781* (Russian.) Theory of Diffusion Vibrations in Gas Discharge Plasma. **K teorii diffuzionnykh kolebanii v gazorazriadnoi plazme.** O. V. Prudkovskaia. *Doklady Akademii Nauk SSSR*, v. 117, no. 4, Dec. 1, 1957, p. 601-604.

Analysis of the dispersion equation of diffusion vibrations shows that quasi-neutral waves are present in real plasmas in which the Debye radius is .01 and .001 cm.

8782* (German.) The Non-Preservation of Parity in β-Dissociation. **Über die Nichterhaltung der Parität beim β-Zerfall.** I. S. Schapiro. *Fortschritte der Physik*, v. 5, no. 12, 1957, p. 615-631.

8783 (German.) Determination of the Half-Life of the First Excited State of Cd^{111}. **Bestimmung der Halbivertszeit des ersten angeregten Zustandes von Cd^{111}.** A. Maier and K. P. Meyer. *Helvetica Physica Acta*, v. 30, no. 7, 1957, p. 611-638.

A value of 2.81 ± 0.01 days was found for In^{111} and 84.1 ± 0.5 mμs for Cd^{111}.

8784 (German.) The Artificial Alpha Activity of Gamma Excited Atomic Nuclei. **Die künstliche Alphaaktivität gammaangeregter Atomkerne.** P. Erdős, P. Scherrer, and P. Stoll. *Helvetica Physica Acta*, v. 30, no. 7, 1957, p. 639-690.

Photon induced α-emission of nuclei was investigated with a 32 m.e.v. betatron. New reactions were discovered. Special emphasis was laid on heavy nuclei, where the peak of the (γ,α)-cross section does not coincide with the maximum resonance of photon absorption. The energy spectra of α-particles emitted from Cl and Br were determined by nuclear emulsion techniques.

8785* (Czech.) Material Problems of Nuclear Technique. **Materiálové problémy jaderné techniky.** Rudolf Henych. *Hutnické Listy*, v. 13, no. 2, Feb. 1958, p. 97-104.

Survey of materials used in construction of slow-neutron reactors. The basic properties of metallic construction materials which are required in construction of the working parts of a reactor are good resistance against high and long-time thermal stresses, low absorption of neutrons, high stability and low variability of mechanical and physical properties during long-time irradiation, and good corrosion resistance.

8786* Disposal of Long-Lived Fission Products. J. R. Grover. *Institution of Chemical Engineers, Transactions*, v. 36, no. 1, 1958, p. 43-50.

A process for the permanent fixation of Sr-90 and Cs-137 in which the highly active ions are adsorbed on granulated montmorillonite clay and fixed by firing the clay to 1200 C.

8787 Preparation of Carrier-Free Scandium and Vanadium Activities From Titanium Cyclotron Targets. Robert I. Walter. *Journal of Inorganic and Nuclear Chemistry*, v. 6, no. 1, Feb. 1958, p. 63-66.

The separation in high yields of carrier-free Sc^{46} and $V^{48,49}$ activities from deuteron-bombarded Ti cyclotron targets involves distillation of V and Ti chlorides (with Sc and Ca chlorides left behind), separation of V from solution in refluxing $TiCl_4$ on a fresh CuCl surface, and removal of milligram amounts of Ti by ion exchange.

8788 The Neutron Total Cross-Sections of Uranium-234 and Uranium-236. G. J. McCallum. *Journal of Nuclear Energy*, v. 6, no. 3, 1958, p. 181-190.

8789 Neutron Poison by Gaseous Fission Products. P. C. Davidge and C. J. L. Lock. *Journal of Nuclear Energy*, v. 6, no. 3, 1958, p. 191-196.

In a liquid-fuel reactor, the poisoning due to gaseous-fission products and their daughters can be reduced to a low level, if the fission-product halogens are rapidly removed from the reactor.

8790 Measurements of the Energy Dependence of the Fission Neutron Yield per Neutron Absorbed in ^{239}Pu and ^{235}U in th Range 0·006-0·36 eV. H. M. Skarsgard and C. J. Kenward. *Journal of Nuclear Energy*, v. 6, no. 3, 1958, p. 212-221 + 1 plate.

8791 The Standardization of Neutron Sources Using the Graphite Stack of a Reactor. B. G. Erozolimsky and P. E. Spivak. *Journal of Nuclear Energy*, v. 6, no. 3, 1958, p. 243-250. (Translated from *Atomnaia Energiia*, v. 2, 1957, p. 1327.)

Method involves the comparison, within a graphite stack, of the effect of the source with that of a sink created by introducing an absorber.

8792* (French.) Excitation of the 4.43 Mev Level of C^{12} by Protons of About One Hundred Mev. **L'excitation du niveau de 4,43 MeV du ^{12}C par des protons d'une Centaine de MeV.** P. Benoist, C. Marty, and P. Meyer. *Journal de Physique et le Radium*, v. 19, no. 1, Jan. 1958, p. 11-12.

The angular distribution of inelastically scattered protons was calculated, assuming for the reaction a direct interaction process, by Born approximation and by taking into account the distortion of the incoming and outgoing proton waves by a complex potential.

8793* (French.) The Beta and Electron Spectrum of RaD. **Le spectre béta et électronique du RaD.** J. Tousset and A. Moussa. *Journal de Physique et le Radium*, v. 19, no. 1, Jan. 1958, p. 39-40.

The two nuclear β-spectra of 15 and 61 k.e.v. were separated from the Auger *L* electrons. The fluorescence and Auger yields of the *L* shell were measured.

8794* (French.) New Experimental Data, Obtained by Radioactivity and Nuclear Reactions on Molybdenum Isotopes. Attempted Interpretation of Some Excited Levels. **Nouvelles données expérimentales sur les isotopes de molybdène. Essai d'interprétation de certains niveaux excités.** C. Levi and L. Papineau. *Journal de Physique et le Radium*, v. 19, no. 1, Jan. 1958, p. 51-53.

The level distance $d\ 5/2-g\ 7/2$ is greater than 1 m.e.v.; the shell model alone cannot explain the lower levels.

8795* (Hungarian.) The Optical Model. **Az optikai modell.** F. M. Medina and G. Süssmann. *Magyar Fizikai Folyóirat*, v. 5, no. 6, 1957, p. 537-574.

A study of the application of the optical model to a very high neutron energy of about 100 m.e.v. The intermediate neutrons theory; general scattering theory; resonance structure and geometrical-optical approximation.

8796* (Hungarian.) Nuclear Fission. **A maghasadás.** Niels Bohr and John Archibald Wheeler. *Magyar Fizikai Folyóirat*, v. 5, no. 6, 1957, p. 575-596.

The nuclear fission mechanism and ensuing reactions. Effect of the charge and mass of the nucleus on the energy liberated. Atomic stability and critical deformation. Disintegration of an intermediate system as a one-molecule reaction.

8797 The Nonconservation of Parity. Philip S. Jastram. *News in Engineering at Ohio State University*, v. 30, no. 1, Feb. 1958, p. 23-30.

Development of theory that parity is not conserved in weak interactions. Discussion of parity and its conservation against the background of other more familiar conservation laws in physics. Some consequences of parity nonconservation for nuclear β decay.

8798* Small Gas Compressor for Accelerator Ion Sources. Antonio Tanarro. *Nuclear Instruments*, v. 2, Jan. 1958, p. 13-14.

A small, simple compressor designed to fill with deuterium the storage tank of the ion source in a Van de Graaff accelerator up to a pressure of five atmospheres.

8799* The Electromagnetic Isotope Separator in Copenhagen. K. O. Nielsen and O. Skilbreid. *Nuclear Instruments*, v. 2, Jan. 1958, p. 15-33.

Details of an isotope separator of a 90° sector type with 800 mm. radius and 50 kv. accelerating voltage.

8800* Automatic Counting-Rate Recorder. M. A. Pomerantz and A. E. Smith. *Nuclear Instruments*, v. 2, Jan. 1958, p. 49-52.

Recorder, designed for a cosmic-ray neutron monitor station, incorporates a scale-shifting arrangement which automatically changes the sensitivity as required.

8801* Polarization of Electrons Emitted in β-Decay. A. I. Alikhanov, G. P. Eliseiev, V. A. Lubimov, and B. V. Ershler. *Nuclear Physics*, v. 5, no. 4, Mar. 1958, p. 588-594.

Spin of the emerging β-electrons is opposite to the direction of electron motion. Magnitude of the longitudinal polarization agrees with the theoretical value.

8802* On Anomalous Conversion Coefficients of Dipole Transitions. Sven Gösta Nilsson and John O. Rasmussen. *Nuclear Physics*, v. 5, no. 4, Mar. 1958, p. 617-646.

General aspects of the problem of anomalous nuclear-structure-dependent contributions to the internal-conversion process are considered in conjunction with highly retarded electric or magnetic dipole transitions.

8803* Elastic Scattering of Gamma-Rays. N. Cindro and K. Ilakovac. *Nuclear Physics*, v. 5, no. 4, Mar. 1958, p. 647-652.

Measurements of elastic scattering of 0.66, 1.12, and 1.33 Mev γ-rays from medium and heavy nuclei, designed to investigate energy and *Z* dependence.

8804* Ten-Group Calculated Equilibrium Neutron Spectrum and Diffusion Length in Natural Uranium. D. Meneghetti, H. H. Hummel, and W. B. Loewenstein. *Nuclear Science and Engineering*, v. 3, Feb. 1958, p. 151-160.

8805 Tritium Tracing—A Rediscovery. *Nucleonics*, v. 16, Mar. 1958, p. 62-67.

Better labeling techniques, more sensitive detection, and lower price bring new usefulness to tritium. Good half-life and versatility make this radiohydrogen valuable to biologist, chemists, and geologists.

8806 Thermal-Neutron Data for the Elements. M. V. Davis and D. T. Hauser. *Nucleonics*, v. 16, Mar. 1958, p. 87-89.

Tabulated data on all the elements plus some O compounds.

8807 Neutron Detectors for Operation at 400°C. Stefan G. Kaufmann and Leroy E. Pahis. *Nucleonics*, v. 16, Mar. 1958, p. 90 + 2 pages.

8808* (English.) **Study on α Radioactivity in Low Concentration.** R. Dugnani Lonati, et al. *Nuovo Cimento*, v. 7, ser. 10, no. 2, Jan. 1958, p. 133-141.

With an ionization chamber filled with Ar(98%) and N_2(2%) and with an emitting surface of 1100 cm^2 it is possible to analyze, by means of their α spectra, samples of radioactive material in concentrations up to about 10^{-6} units.

8809* (English.) **Fluctuations in Track Parameters in Nuclear Emulsions.** B. J. O'Brien. *Nuovo Cimento*, v. 7, ser. 10, no. 2, Jan. 1958, p. 147-162.

The fluctuations in nuclear-emulsion track parameters were studied in a G5 emulsion of low minimum grain density by measurements of the blob density and integral gap length of long tracks of relativistic heavy nuclei. Results show good agreement with Blatt fluctuation theory predictions.

8810* (English.) **Dispersion Relations for Momentum Transfer Heavy Meson-Nucleon Scattering.** D. Amati and B. Vitale. *Nuovo Cimento*, v. 7, ser. 10, no. 2, Jan. 1958, p. 190-199.

Relativistic dispersion relations are obtained for all momentum transfer. All the strong interacting fields are taken into account; results are given for both values of the relative parity of heavy mesons and hyperons. The recoil contributions do not alter appreciably the dispersion relations.

8811* (English.) **The Diffusion Coefficient of Thermal Neutrons.** I. Kuščer and M. Ribarič. *Nuovo Cimento*, v. 7, ser. 10, no. 4, Feb. 1958, p. 451-460.

Diffusion of slow neutrons in an extended uniform medium is treated by a method which accounts for the thermal motion of the medium. If neutron capture is absent, a single integral equation has to be solved in order to determine the velocity distribution and the diffusion coefficient. A system of such equations is obtained for a capturing medium.

8812* (English.) **The Influence of the Anomalous Magnetic Moment on the Spin Kinematics of Electrons in a Uniform Magnetic Field.** M. Carrassi. *Nuovo Cimento*, v. 7, ser. 10, no. 4, Feb. 1958, p. 524-535.

The influence of a uniform magnetic field on the spin orientation of electrons, or other spin-½ particles, in a beam is computed by assuming that the Dirac-Pauli equation correctly represents the electrons having anomalous magnetic moment. When the field is orthogonal to the electron beam, the anomalous magnetic moment causes the spin to turn about the field direction faster than in the normal condition.

8813 Monitoring, Control and Safety Equipment for a Nuclear Reactor of the Swimming-Pool Type. I. General Description. M. van Tol. *Philips Technical Review*, v. 19, no. 9, Feb. 1958, p. 245-257.

8814 (English.) **The Decay of the Nuclides ^{75}Se and ^{75}Ge.** H. J. Van Den Bold, J. Van De Geijn, and P. M. Endt. *Physica*, v. 24, no. 1, Jan. 1958, p. 23-38.

8815 (English.) **Further Study on the Decay of ^{57}Ni.** J. Konijn, H. L. Hagedoorn, and B. Van Nooijen. *Physica*, v. 24, no. 2, Feb. 1958, p. 129-136.

In contradiction to earlier results only three γ-rays were found; the 127 k.e.v. γ-ray transition is weaker than reported before and occurs only in (14 ± 1)% of the Ni^{57} disintegrations. The intensities of possible γ-rays of 400 to 520 k.e.v. are smaller than 0.5 and 1% respectively.

8816 Properties of Nuclear Matter. K. A. Brueckner and J. L. Gammel. *Physical Review*, v. 109, ser. 2, no. 4, Feb. 15, 1958, p. 1023-1039.

The binding energy of nuclear matter, neglecting Coulomb forces, is 14.6 m.e.v. per particle at a density corresponding to a radius parameter of 10^{-13} cm. The Coulomb repulsion in a heavy nucleus is shown to drop the density by approximately 15%. The tensor force gives approximately 6 m.e.v. binding energy.

8817 Ultrasonically Induced Spin Transitions in Sodium Iodide. D. A. Jennings, W. H. Tanttila, and O. Kraus. *Physical Review*, v. 109, ser. 2, no. 4, Feb. 15, 1958, p. 1059-1062.

The influence of ultrasonic vibrations on the nuclear magnetization in a single crystal of NaI was studied.

8818 Gamma Rays From $C^{13} + d$ and the Excited States of C^{14}. E. K. Warburton and H. J. Rose. *Physical Review*, v. 109, ser. 2, no. 4, Feb. 15, 1958, p. 1199-1210.

8819 Neptunium Isotopes: 234, 235, 236. J. E. Gindler, J. R. Huizenga, and D. W. Engelkemeir. *Physical Review*, v. 109, ser. 2, no. 4, Feb. 15, 1958, p. 1263-1267.

Isotopes were produced by an 18 Mev deuteron bombardment of U highly enriched in U^{235}.

8820 Measurement of the Total Absorption Coefficient of Long-Lived Neutral *K* Particles. W. K. H. Panofsky, V. L. Fitch, R. M. Motley, and W. G. Chesnut. *Physical Review*, v. 109, ser. 2, no. 4, Feb. 15, 1958, p. 1353-1357.

The observed value of $\sigma = 1.12 \pm 0.25$ barns in Cu is compared with the corresponding values for charged-*K*-particle cross sections.

8821 Nucleon-Antinucleon Interaction at Intermediate Energies. James S. Ball and Geoffrey F. Chew. *Physical Review*, v. 109, ser. 2, no. 4, Feb. 15, 1958, p. 1385-1391.

The Yukawa interaction is investigated between 50 and 200 Mev. Cross sections are primarily determined by the pion exchange potential for distances greater than 10^{-13} cm.

8822 Theoretical Investigation of the Electronic Energy Band Structure of Solids. Frank Herman. *Reviews of Modern Physics*, v. 30, no. 1, Jan. 1958, p. 102-121.

8823 The Absorption of High-Energy Photons in Matter. J. Moffatt, J. J. Thresher, G. C. Weeks, and R. Wilson. *Royal Society, Proceedings*, v. 244, ser. A, Mar. 11, 1958, p. 245-258.

Total absorption cross-sections of H, C, Cu, Ag, Pb, and U were measured for photons of 94 m.e.v. mean energy.

8824 Particle Accelerators. Robert R. Wilson. *Scientific American*, v. 198, Mar. 1958, p. 65 + 10 pages.

The evolution of these huge machines, used to "see" fundamental particles of matter and to create new ones.

8825 (German.) Numerical Principles Regarding Treatment With Radioactive Isotopes. **Rechnerische Grundlagen zum Umgang mit radioaktiven Isotopen.** E. Hanke. *Technik*, v. 13, no. 2, Feb. 1958, p. 86-93.

Radioactive sources for nondestructive testing of materials. Artificial γ sources. Half life and law of decay applied to seven radioactive elements. Protective distances required with free irradiating preparations. Calculation of the protective Pb layer.

8826 Shielding Characteristics of Air, Soil, Water, Wood and Other Common Materials. v. II. Attenuation of Gamma Rays and Neutrons. David Spielberg. *U. S. Atomic Energy Commission*, *WKNL*-89, Mar. 25, 1957, 186 pp. (UF767 Un3.1wk Contin.)

Dose and heating rates for γ-ray and neutron attenuation through infinite-slab shields. Transformation to other geometries.

8827 Long-Lived Aluminum-26. Robert A. Rightmire. *U. S. Atomic Energy Commission*, *NYO*-6633, June 3, 1957, 152 pp. (UF767 U3ny Contin.)

Nuclear properties and methods of production, isolation, and purification.

8828 Progress Relating to Civilian Applications During September, 1957. Russell W. Dayton and Clyde R. Tipton, Jr. U. S. Atomic Energy Commission, BMI-1226, Oct. 1, 1957, 51 pp. (UF767 U3b Contin.)

Reports research on Zr- and Al-clad and other fuel elements, solidification of U, fatigue of Inconel, U and U-alloy fuels, evaluation of a reflector-controlled heterogeneous boiling reactor, Na-Ta compatibility at high temperatures, and associated problems.

8829 A Semi-Empirical Method of Calculating the Energy-Absorption Build-Up Factor With an Application to a Uniformly Contaminated Space Having Spherical Boundaries. Keran O'Brien, Wayne M. Lowder, and Leonard R. Solon. *U. S. Atomic Energy Commission*, *HASL*-2, Oct. 14, 1957, 15 pp. (UF767 Un3.1ha Contin.)

A form for the point-source γ-ray energy absorption build-up function valid for a material in the energy range where it is essentially a Compton scatterer is suggested as a modification of the asymptotic forms derived by U. Fano. An application to the problem of uniformly and continuously distributed point-source is discussed.

8830 Beta and Gamma Dose Rates From Terrestrially Distributed Sources. Keran O'Brien, Wayne M. Lowder, and Leonard R. Solon. *U. S. Atomic Energy Commission, HASL-3*, Oct. 28, 1957, 16 pp. (UF767 Un3.1ha Contin.)

Dose rates in air and at various depths in tissue produced by concentrations of natural isotopes in the ground are calculated for both β and γ radiation. Calculated gonadal "screening factors" are within 4% of the experimental values reported by the British Medical Research Council.

8831 Attenuation of Scattered Cobalt 60 Radiation in Lead and Building Materials. R. T. Mooney and C. B. Braestrup. *U. S. Atomic Energy Commission, NYO-2165*, Oct. 29, 1957, 24 pp. (UF767 U3ny Contin.)

8832 The Internal Environment of Underground Structures Subjected to Nuclear Blast. I. The Occurrence of Dust. Clayton S. White, Mead B. Wetherbe, and Vernon C. Goldizen. *U. S. Atomic Energy Commission, ITR-1447*, Nov. 22, 1957, 69 pp. (UF767 Un3.1it Contin.)

8833 The Internal Environment of Underground Structures Subjected to Nuclear Blast. II. Effects on Mice Located in Heavy Concrete Shelters. D. R. Richmond, T. L. Chiffelle, R. T. Sanchez, and J. D. Ward. *U. S. Atomic Energy Commission, ITR-1507*, Nov. 29, 1957, 29 pp. (UF767 Un3.1it Contin.)

8834 Reactor and Plant Engineering. *U. S. Atomic Energy Commission, WAPD-BT-5*, Dec. 1957, 146 pp. (UF767 Un3.1wb Contin.)

Thirteen papers on matters pertinent to the design and operation of reactors and reactor components.

8835 Field Test of Reinforced-Concrete Dome Shelters and Prototype Door. G. L. Neidhardt, R. S. Koike, T. G. Morrison, and W. Tuggle. *U. S. Atomic Energy Commission, ITR-1448*, Dec. 20, 1957, 62 pp. (UF767 Un3.1it Contin.)

Data on structures exposed to nuclear blast.

8836 Engineering Liaison for MTR-ETR Experiments, Standard Practices Manual. R. J. Nertney. *U. S. Atomic Energy Commission*, IDO-16431, Dec. 20, 1957, 58 pp. (UF767 Un3.1id Contin.)

Outlines design of a typical single-pass air-cooled experiment, a typical high pressure water loop, a typical U-Bi system, and a typical recirculating gas-cooled experiment.

8837* Controlled Thermonuclear Power. *Wireless World*, v. 64, Mar. 1958, p. 111-114.

Recent results of research on high-temperature plasmas.

8838* (German.) Multiple Meson Production in Nucleon-Nucleon Collisions and Nucleon-Antinucleon Annihilation. **Über die multiple Mesonenproduktion bei Nukleon-Nukleon-Stössen und bei der Nukleon-Antinukleon-Vernichtung.** Martin Kretzschmar. *Zeitschrift für Physik*, v. 150, no. 3, 1958, p. 247-263.

8839* (Russian.) The Separation of Radioactive Isotopes Without Carriers. **Vydelenie radioaktivnykh izototopv bez nositelei.** N. P. Rudenko. *Zhurnal Neorganicheskoi Khimii*, v. 3, Jan. 1958, p. 167-174.

8840* (Russian.) The Use of Carbonyls for Separating Radioisotopes Cr^{51}, Mo^{99}, W^{187}, Tc^{99m}, and Re^{188}. Concentration of Cr^{51}, Mo^{99} and W^{187}. **Ispol'zovanie karbonilov dlia vydeleniia radioizotopov Cr^{51}, Mo^{99}, i W^{187}, Tc^{99m} and Re^{188}. Kontsentrirovanie Cr^{51}, Mo^{99} i W^{187}.** V. D. Nefedov and M. A. Toropova. *Zhurnal Neorganicheskoi Khimii*, v. 3, Jan. 1958, p. 175-180.

The concentration factors for Cr^{51}, Mo^{99}, and W^{187} are $1.8 \cdot 10^4$, $3 \cdot 10^4$, and $0.7 \cdot 10^4$ respectively.

8841* (Russian.) The Use of the Radioautography Method for Controlling Radiochemical Purity of α-Radioactive Emitters. **Primenenie metoda radioavtografii dlia kontrolia radiokhimicheskoi chistoty α-radioaktivnykh izluchatelei.** V. I. Baranov, K. B. Zaborenko, and V. I. Korobkov. *Zhurnal Neorganicheskoi Khimii*, v. 3, Jan. 1958, p. 184-186.

The radiochemical purity of isotope Th^{230} was determined by means of photographic emulsions.

See also: **7835** (radiation chemical processing); **7836** (hydroclone separation of fission products); **7866** (nuclear fuel reprocessing equipment); **7943** (study of Hg-203 and its ions); **8002** (protection against lethal radiation); **8038** (alkali halide phosphates for scintillation); **8096** (mass transfer in liquid metal systems); **8126** (liquid-liquid extraction of radioactive elements); **8165** (Zr clad fuel elements); **8185** (electrical process control system for nuclear power plant); **8212** (engineering design of the EBWR); **8456** (uses of Zr in the nuclear field); **8459** (nuclear reactor metallurgy); **8460** (nuclear poison and control alloys); **8461** (48 wt.% U-Al fuel elements in MTR); **8465** (corrosion problems with liquid metal coolants); **8737** (metallography of irradiated UO_2-containing fuel elements); **8825** radiation devices for non-destructive testing); **8913** (plastic scintillators); **8914** (scintillation of carbo- and heterocyclic compounds); **8995** (irradiation and elastomers).

OPERATIONS RESEARCH AND MANAGEMENT ENGINEERING

8842 Human Engineering. Ernest J. McCormick. 467 pp. 1957. McGraw-Hill, New York. (TA175 M13h)

Methods and implications of human engineering research. Applications to human engineering problems. Functioning of human beings in work situations.

8843 Human Understanding in Industry. A Guide for Supervisors. William C. Menninger and Harry Levinson. 102 pp. 1956. Science Research Associates, Chicago. (HF5549 M52h)

This handbook for supervisors desiring to learn more about understanding people delves deep into the reasons behind and ways of dealing with personalities.

8844 Job Attitudes: Review of Research and Opinion. Frederick Herzberg, Bernard Mausner, Richard O. Peterson, and Dora F. Capwell. 279 pp. 1957. Psychological Service of Pittsburgh. (HD4904 H44j)

Prevalence of job dissatisfaction; characteristics of dissatisfied workers; factors related to job attitudes; social aspects of the job; supervision and job attitudes; vocational selection; mental health in industry.

8845 System Engineering. An Introduction to the Design of Large-Scale Systems. Harry H. Goode and Robert E. Machol. 551 pp. 1957. McGraw-Hill, New York. (TA153 G61s)

Shows how a number of very important fields such as statistics, computers, game theory, information theory, servomechanisms, and control are put together by system engineers to attack large-scale problems in engineering, such as development of radar, telephone, or guided-missile systems.

ORE AND MATERIALS BENEFICIATION

8846 Upgrading Iron Ore by Fluidized Magnetic Conversion. Robert J. Priestly. *Blast Furnace and Steel Plant*, v. 46, Mar. 1958, p. 303-306.

8847* (Czech.) Fluidized Method of Ore Roasting. **Fluidační pražení rud.** Ferdinand Kadlec. *Hutník*, v. 8, no. 1, Jan. 1958, p. 22-26.

Advantages of fluidized methods for non-ferrous metals, including production increases and cost reduction. Application in separation, extraction, or beneficiation.

8848* **Application of the Fluidized Solids Process to Drying.** M. W. Brandt. *Mines Magazine*, v. 48, Feb. 1958, p. 19-22.

Fluidization system and drying process. Application to limestone, dolimite, blast furnace slag, chemicals, and phosphate rock.

8849* **Mineral Dressing.** Norman Weiss. *Mining Congress Journal*, v. 44, Feb. 1958, p. 70-74.

A review of 1957. The physical processes of separation are supplemented and in some cases replaced with wet and dry processes that involve chemical or physical change.

8850* **Cyclone Classification at Chuquicamata.** D. S. Sanders. *Mining Congress Journal*, v. 44, Mar. 1958, p. 55 + 4 pages.

Using cyclones in place of spiral classifiers, the present set-up of ten rod mills and ten ball mills can be changed to ten rod rod mills and fifteen ball mills—without an increase in plant area. As a result, grinding capacity is expected to increase from about 38,000 to 45,000 tons per 24 hr.

8851 The Shaft Furnace. Pelletizing Taconite Concentrates. F. D. DeVaney. *Mining Engineering*, v. 10, Mar. 1958, p. 361-364.

For very fine ores, this process offers advantages in fuel economy and low capital installation cost, yet produces a high quality blast furnace material.

8852* (German.) Limits and Possibilities of Modern Preparation Techniques. **Grenzen und Möglichkeiten der neuzeitlichen Aufbereitungstechnik.** Helmut Kirchberg. *Neue Hütte*, v. 3, no. 1, Jan. 1958, p. 1-9.

The problem of exploration. Pre-concentration of poor ores with heavy liquid processes. Concentration of poor siliceous iron ores. Preparation of other minerals.

8853* (Czech.) Adsorption of Phenols From Ammonia Waters by Coal Slime. **Adsorpce fenolů čpavkových vod uhelnými kaly.** J. Hřebačka. *Paliva*, v. 38, no. 2, Feb. 1958, p. 47-50.

Possible utilization of waste NH_3 water in coal flotation, based on the sorption effect of the coal grains during the flotation process. Possibilities of decreased comsumption of flotation oils, and of an effective decrease of phenol content in the NH_3 waters.

8854* (Russian.) Flotation Properties of the Heavy Pyridine Bases. **Flotatsionnye svoistva tiazhelykh piridinovykh osnovanii.** M. M. Potashnikov, F. I. Nagirniak, S. N. Ostroukhov, and L. I. Bagina. *Tsvetnye Metally*, v. 31, no. 1, Jan. 1958, p. 18-23.

Pine oil used in the flotation of sulfide Cu ore and cresol used in flotation of Cu-Zn ore can be replaced by less expensive distilled pyridine bases from coal tar.

8855* (Russian.) Control of Oxygen Content During the Selective Flotation of Lead-Copper-Zinc Pyrite Ore. **Kislorodnyi rezhim pul'py v protsesse selektivnoi flotatsii svintsovo-medno-tsinkovo-piritnoi rudy.** L. A. Glazunov, S. I. Mitrofanov, and O. A. Ratnikova. *Tsvetnye Metally*, v. 31, no. 2, Feb. 1958, p. 1-6.

Control is best realized at the point of discharge of the contact tank. The amount of O here depends on the Na_2S and iron sulfate fed into the mill and contact tank, and on the duration of contact.

8856* (Russian.) Using the Oxygen-Enriched Blast in Fluo-Solid Roasting of Zinc Concentrates. **Obzhig tsinkovykh kontsentratov v kipiashchem sloe v srede vozdukha, obogashchennogo kislorodom.** B. I. Skachkov. *Tsvetnye Metally*, v. 31, no. 2, Feb. 1958, p. 28-35.

The use of air enriched up to 50% with O increases the furnace production threefold, and the yield of Zn by 2%. The gases obtained by this process contain 22% SO_2.

PHYSICS

8857 (English.) **The Absorption of Sound in Argon, Nitrogen and Oxygen.** W. Tempest and H. D. Parbrook. *Acustica*, v. 7, no. 6, 1957, p. 354-362.

Some improved values for sound absorption in the frequency/pressure range 0.45 to 12.6 Mc/s atm. are compared with theoretical values.

8858 (English.) **Acoustic Properties of Flexible and Porous Materials.** C. W. Kosten and J. H. Janssen. *Acustica*, v. 7, no. 6, 1957, p. 372-378.

The theory of Zwikker and Kosten for the propagation of sound waves in such materials is extended. An increase of the sound absorption coefficient in the L.F. region is related to flexibility.

8859 (German.) Measuring the Diffusivity of Sound Fields by Means of Correlations. **Zur Messung der diffusität von Schallfeldern durch Korrelation.** P. Dämmig. *Acustica*, v. 7, no. 6, 1957, p. 387-398.

The correlation coefficients for sound fields in very large halls are often partially characteristic of a given diffusivity.

8860 (German.) The Problem of Bending Wave Radiation. **Zum Problem der Abstrahlung von Biegewellen.** L. Cremer and G. Schwantke. *Acustica (Supplement)*, v. 7, no. 1, 1957, p. 329-335.

Effect of the receiving enclosure on the radiation of vibrating plates. Radiation characterized by the normalized means square value of the sound pressure for planes parallel to the plate.

8861 (German.) Propagation of Sounds in Buildings. **Ausbreitung von Körperschall in Gebäuden.** Wolfgang Westphal. *Acustica (Supplement)*, v. 7, no. 1, 1957, p. 335-348.

Simple methods for calculating the propagation of sounds in buildings are described and the influence of relevant parameters shown. An electric network based on the theory is built up.

8862 Effect of Pressure on Ultrasonic Relaxation in Liquids. II. T. A. Litovitz and E. H. Carnevale. *Acoustical Society of America, Journal*, v. 30, Feb. 1958, p. 134-136.

Ultrasonic absorption and velocity in acetic acid and triethylamine were measured up to pressures of 3280 kg/cm^2. The relaxation frequency in each liquid is independent of pressure to within experimental accuracy (± 5%).

8863* (Russian.) New Data on the Orientation of the Birefringence in Flowing Polymer Solutions. **Novye svedeniia ob orientatsii dvoinogo luchepreломleniia v potoke rastvorov polimerov.** E. V. Frisman. *Akademiia Nauk SSSR, Doklady*, v. 118, no. 1, Jan. 1, 1958, p. 72-74.

Analyzes the relationship between double refraction of polystyrene solutions in dioxane and the velocity gradient.

8864 (Russian.) Effect of a Space Charge on the Electron-Optic Properties of an Electrostatic System With One or Two Planes of Symmetry. **Vliianie prostranstvennogo zariada na elektronnooptícheskii svoistva elektrostaticheskikh sistem s odnoi ili dvumia ploskostiami simmetrii.** A. M. Strashkevich. *Akademiia Nauk Ukrains'koi RSR, Dopovidi*, 1958, no. 1, p. 3-6.

The basic formulas of relativistic electron optics are derived, taking into consideration the effect of a space charge in the central region of the field.

8865* (French.) Theory of the High Frequency Discharge in Low Pressure Gases. Experimental Study of the High Frequency Type Ion Sources. **Théorie de la décharge haute fréquence dan les gaz aux faibles pressions. Étude expérimentale des sources d'ions du type haute fréquence.** Jean Salmon. *Annales de Physique*, v. 2, ser. 13, nos. 11-12, Nov.-Dec. 1957, p. 827-880.

Calculation of the distribution function of electrons present in a gas. Electronic density inside a discharge tube. Importance of the secondary emission of the tube walls for electron multiplication. Description of a source operating at 96.5 Mc/s.

8866* (French.) Investigations of the Raman Diffusion Spectrum of Water in Hydrated Crystals. **Recherches sur le spectre de diffusion raman de l'eau dans des cristaux hydratés.** Annette Weil-Marchand. *Annales de Physique*, v. 2, ser. 13, nos. 11-12, Nov.-Dec. 1957, p. 881-926.

Determining the orientation of the water molecules in the crystalline unit cell in water and the deformations incurred by these molecules because of their surroundings.

8867* (German.) Rotation Analysis of the Visible Vanadium Oxide Bands. **Rotationsanalyse der sichtbaren Vanadiumoxydbanden.** Albin Lagerqvist and Lars-Erik Selin. *Arkiv för Fysik*, v. 12, no. 6, 1957, p. 553-568.

Analysis of the bands: 2-0, 1-0, 0-0, 0-1, and 0-2.

8868 The Thermal Conductivity of Nitrogen and Argon in the Liquid and Gaseous States. H. Ziebland and J. T. A. Burton. *British Journal of Applied Physics*, v. 9, Feb. 1958, p. 52-59.

Covers the range 85 to 200 K at pressures from 1 to 135 atm.

8869 Operation of an Inverted-Magnetron Gauge in the Pressure Range 10^{-5} to 10^{-12} mm. Hg. J. P. Hobson and P. A. Redhead. *Canadian Journal of Physics*, v. 36, Mar. 1958, p. 271-288.

Cold-cathode ionization gage with axial magnetic field and radial electric field has a sensitivity of about 1 amp./mm. Hg.

8870 Mechanical Strength of Ice Frozen From an Impure Melt. E. R. Pounder. *Canadian Journal of Physics*, v. 36, Mar. 1958, p. 363-370 + 1 plate.

Ice frozen from melts containing small amounts of light alcohol, ketone, or ether is much weaker than normal ice, for a limited freezing exposure. The weakening effect is enhanced if the melt also contains traces of a variety of long-chain, organic substances, the most effective being sodium carboxymethyl cellulose.

8871* (German.) Relationships Between the Density of Liquids and the Suspended Weight Ratio. **Beziehungen zwischen der Dichte und dem Tauchgewichtsverhältnis von Flüssigkeiten.** Georg Roeder. *Chemiker-Zeitung*, v. 82, no. 5, Mar. 5, 1958, p. 140-143.

Requirements for the correctness of the pycnometric determination of density of liquids. A formula is given for correct calculation when the liquid is weighed in air of density different from that in which the water is weighed.

8872* (French.) Quantic Theory of the Faraday Rotation in Chrome Alum With Centrimetric Wavelengths and Testing. **Théorie quantique de la rotation de Faraday dans l'alun de chrome, aux longueurs d'ondes centimétriques et sa confrontation avec l'expérience.** Burhan Cahit Unal, Alfred Chevalier, and Théo Kahan. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences*, v. 246, no. 6, Feb. 10, 1958, p. 901-903.

The theory studied is valid for the paramagnetic transparency area where the spin-spin interaction had no part.

8873* (French.) Dynamic Polarization of the Silicon-29 Nuclei in Silicon. **Polarisation dynamique des noyaux du silicium 29 dans le silicium.** Anatole Abragam, Jean Combrisson, and Ionel Solomon. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences*, v. 246, no. 7, Feb. 17, 1958, p. 1035-1037.

Extending the Overhauser effect to semiconductors considerably increased the nuclear resonance signal due to Si^{29} by saturation of the resonance of the conductive electrons of a Si specimen. The resulting nuclear polarization is maintained for several minutes at room temperature.

8874* (Russian.) Some Regularities in the Structure of X-Ray Emission K-Spectra of Titanium in Titanates. **O nekotorykh zakonomernostiakh v strukture rentgenovskikh K-spektrov ispuskaniia titana v titanatakh.** Z. E. Vainshtein, M. N. Bril', and I. B. Staryi. *Doklady Akademii Nauk SSSR*, v. 117, no. 4, Dec. 1, 1957, p. 597-600.

8875* (German.) The Integration in Functional Spaces and Its Application in the Quantum Theory. **Die Integration in Funktionenräumen und ihre Anwendung in der Quantentheorie.** I. M. Gelfand and A. M. Jaglom. *Fortschritte der Physik*, v. 5, nos. 10-11, 1957, p. 517-556.

8876* Anomalous Dispersion Method of Determining Structure and Absolute Configuration of Crystals. S. Raman. *Indian Academy of Sciences, Proceedings*, v. 47, sec. A, no. 1, Jan. 1958, p. 1-11.

8877* Thermo-Elastic Behaviour of Cubic Crystals. S. V. Subrahmanyam. *Indian Academy of Sciences, Proceedings*, v. 47, sec. A, no. 1, Jan. 1958, p. 25-29.

The composite piezoelectric oscillator method was used to study the temperature dependence of the elastic moduli of single crystals of KCl, KBr, LiF, NH_4Cl, FeS_2, Fe_2O_3, CaF_2, and PbS in the range from 30 to 300 C.

8878 Thermoelectric Effects. Frank E. Jaumot, Jr. *I.R.E. Proceedings*, v. 46, Mar. 1958, p. 538-554.

A review of thermoelectric effects in solids, with emphasis on the practical application of these effects.

8879 Explosive-Induced Shock Waves. II. Oblique Shock Waves. William E. Drummond. *Journal of Applied Physics*, v. 29, Feb. 1958, p. 167-170.

The explosive production of oblique shock waves in solids is analyzed in the approximation that third and higher order terms in the shock strength can be neglected, and a procedure is developed for calculating the attenuation of the shocks. Application is made to the problem of determining the equation of state of the burned explosive gas.

8880 Experimental Investigations on the Light Scattering of Colloidal Spheres. III. The Specific Scattering at 90°. Richard M. Tabibian and Wilfried Heller. *Journal of Colloid Science*, v. 13, no. 1, Feb. 1958, p. 6-23.

8881* (Russian.) Ultrasonic Velocity and Compressibility of Concentrated Solutions of Strong Electrolytes. **Skorost' zvuka i szhimaemost' kontsentrirovannykh rastvorov sil'nykh elektrolitov.** I. G. Mikhailov, L. I. Savina, and G. N. Feofanov. *Leningrad. Universitet. Vestnik*, v. 12, no. 22, 1957, p. 25-42.

Measurements of ultrasonic velocity in aqueous salt solutions by means of the ultrasonic interferometer in the range of temperatures from 0 to 90 C. The temperature maximum of the ultrasonic velocity observed in clear water was higher than that occurring in the salt solutions.

8882* (Hungarian.) The Principles of Variation in Relativistic Dynamics. **Variációs elvek a relativisztikus dinamikában.** Géza Szamosi and György Marx. *Magyar Fizikai Folyóirat*, v. 5, no. 6, 1957, p. 511-522.

Building up a canonical covariance method in relativistic dynamics, perfectly similar to the variation theory of classical mechanics. D'Alembert's and Hamilton's principles, canonical equation, and quantum mechanics solution.

8883 Temperature Dependence of the Magnetic Properties of Ferroxdure 2. F. Tomholt and E. Haes. *Matronics*, no. 13, Dec. 1957, p. 225-228. (TK453 M42 Contin.)

8884 Sole Birefringent Filter. John W. Evans. *Optical Society of America, Journal*, v. 48, Mar. 1958, p. 142-145.

Analysis of new filter composed of a series of retardation plates between a single pair of polarizers.

8885 General Theory of Optically Compensated Varifocal Systems. Leonard Bergstein. *Optical Society of America, Journal*, v. 48, Mar. 1958, p. 154-171.

Shows that n alternately stationary and relatively fixed (to each other) movable lens components can be arranged to produce an optical system which will have an over-all focal length variable continuously between any two predetermined values upon a displacement of the movable components from their reference position.

8886 Wavelength Dependence of the Scattering Coefficient for Infrared Radiation in Natural Haze. Mathew G. Gibbons. *Optical Society of America, Journal*, v. 48, Mar. 1958, p. 172-176.

8887 Analysis of Interference Fringes From a Flame. Boyd W. Harned and N. Ginsburg. *Optical Society of America, Journal*, v. 48, Mar. 1958, p. 178-183.

The CH emission from an oxyacetylene flame at atmospheric pressure was examined with a Fabry-Perot interferometer crossed with a grating spectrograph. The fringe patterns are analyzed, using four different methods for reduction of data.

8888 (English.) **The Spontaneous Hall Effect in Ferromagnetics. II.** J. Smit. *Physica*, v. 24, no. 1, Jan. 1958, p. 39-51.

The spontaneous part of the Hall effect arising from the spontaneous magnetization is caused by skew scattering of the magnetized conduction electrons (in this case the 3*d*-electrons) due

to their transverse polarization induced by spin-orbit interaction, which acts as an impact parameter in the collision process.

8889 (English.) **Measurements on the Velocity of Sound in Helium Gas at Liquid Helium Temperatures. Calculation of the Specific Heats.** A. Van Itterbeek and W. De Laet. *Physica*, v. 24, no. 1, Jan. 1958, p. 59-67.

8890 (English.) **Paramagnetic Relaxation in Co-Fe-NH_4-Tutton Salts.** Taiichiro Haseda. *Physica*, v. 24, no. 2, Feb. 1958, p. 93-100.

Interactions between Co^{+2} and Fe^{+2} ions are suggested to have an important role in the relaxation process.

8891 (English.) **On the Molecular Theory of Dielectric Polarization.** M. Mandel and P. Mazur. *Physica*, v. 24, no. 2, Feb. 1958, p. 116-128.

A general statistical mechanical formalism is presented which yields a closed expression for the dielectric constant of a system of polarizable dipoles in terms of averages over molecular quantities.

8892 Properties of Liquid He^3 at Low Temperature. K. A. Brueckner and J. L. Gammel. *Physical Review*, v. 109, ser. 2, no. 4, Feb. 15, 1958, p. 1040-1046.

Values predicted for the equilibrium density, energy, compressibility, specific heat, magnetic susceptibility (and its density variation) are in semiquantitative agreement with experiment.

8893 Origin of Nuclear Magnetic Resonance Shifts in Paramagnetic MnF_2. R. G. Shulman and V. Jaccarino. *Physical Review*, v. 109, ser. 2, no. 4, Feb. 15, 1958, p. 1084-1085.

The shifts are paramagnetic. This could be explained by covalent bonding between F and Mn.

8894 Transient Recombination of Excess Carriers in Semiconductors. G. K. Wertheim. *Physical Review*, v. 109, ser. 2, no. 4, Feb. 15, 1958, p. 1086-1091.

Recombination equations for a system containing an arbitrary number of Shockley-Read recombination centers are formulated. Transient solutions are obtained for the decay following the injection of a pulse of carriers into a system containing one or two centers.

8895 Dielectric Properties of Single Domain Crystals of $BaTiO_3$ at Microwave Frequencies. T. S. Benedict and J. L. Durand. *Physical Review*, v. 109, ser. 2, no. 4, Feb. 15, 1958, p. 1091-1093.

8896* (Spanish.) Solar Engineering. **Ingeniería solar.** J. Baltá Elías. *Revista de Ciencia Aplicada*, v. 11, no. 6, Nov.-Dec. 1957, p. 481-498.

Economical aspect of the use of solar energy. Possible transformations of the sun's radiation. Plane collectors and insulators. Heating, refrigeration, space conditioning. Solar distillers for undrinkable waters and solar furnaces.

8897 An Energy Principle for Hydromagnetic Stability Problems. I. B. Bernstein, E. A. Frieman, M. D. Kruskal, and R. M. Kulsrud. *Royal Society, Proceedings*, v. 244, ser. A, Feb. 25, 1958, p. 17-40.

The problem of the stability of static, highly conducting, fully ionized plasmas is investigated by means of an energy principle developed from one introduced by Lundquist. The method is applied to find complete stability criteria for two types of equilibrium situations.

8898* (German.) Direct Evaluation of Spectra in the Schumann Region. **Direktauswertung von Spektren im Schumanngebiet.** E. Lüscher. Paper from Proceedings of the Colloquium Spectroscopicum Internationale VI. Amsterdam. May, 1956. *Spectrochimica Acta* (Supplement), 1957, p. 71-75.

Geometrical disposition and detectors commonly used. Most appropriate were the photomultiplier with fluorescent screen and the U.V. sensitive but short lived Geiger-Muller counter. Calcium tungstate was the best of fluorescent products.

8899* (German.) Spectrum Excitation in Spark Discharges. **Uber die Spektrumanregung in Funkenentladungen.** S. L. Mandelstam. Paper from Proceedings of the Colloquium Spectroscopicum Internationale VI. Amsterdam. May, 1956. *Spectrochimica Acta* (Supplement), 1957, p. 245-251.

Discharge, in spark-channel formation, was followed by a cylindrical shock wave with a front causing the ionization and the extension of the spark channel.

8900* (French.) Molecular and Atomic Continuous Spectra of Mercury Emission. **Spectres continus moleculaires et atomiques d'emission du mercure.** M. L. Lemmens. Paper from Proceedings of the Colloquium Spectroscopicum Internationale VI. Amsterdam. May, 1956. *Spectrochimica Acta* (Supplement), 1957, p. 318-324.

Continuous Hg vapor spectra from 6400 Å to 2200 Å was obtained by using the electrode discharge as an excitation method. Damped and undamped waves were used. The molecular spectra *CI* and *CII* were distinguished by their relative vertical position in the same spectrogram.

8901* (German.) Part Played by Stepwise Transitions in the Excitation of Spectral Lines. **Über die Rolle der Stufenübergänge bei Anregung von Spektrallinien.** S. Frisch. Paper from Proceedings of the Colloquium Spectroscopicum Internationale VI. Amsterdam. May, 1956. *Spectrochimica Acta* (Supplement), 1957, p. 350-355.

Defining the intensity of the Hg lines as a function of the energy of exciting electrons. The presence of maxima in the optical excitation function was explained by stepwise transitions.

8902* (German.) High-Frequency Torch Form of Discharge as a Spectral Source. **Hochfrequente Fackelentladung als Spektralquelle.** E. Bădărău, B. Giurgea, Gh. Giurgea, and A. T. H. Trutia. Paper from Proceedings of the Colloquium Spectroscopicum Internationale VI. Amsterdam. May, 1956. *Spectrochimica Acta* (Supplement), 1957, p. 441-447.

The brush discharge induced by a rectified H.F. source on a Ni point can be used as a spectral source if it is supplied with an atomized solution of the sample through a co-axial stream of air. The uniformity of the source was tested for $BaCl_2$ and found to be satisfactory.

8903 (Czech.) Silicone Dampers for Torsional Vibrations. **Sliikonové tlumiče torsních kmitů.** J. Trnka. *Strojírenství*, v. 8, no. 2, Feb. 1958, p. 89-96.

Study of methods for damping vibrations in modern high-speed piston engines. Best results were obtained by using vibration dampers operating on the principle of viscous friction and filled with special silicone liquids. Design is simple and reliable.

8904* (French.) Theoretical Study of an Ionic Resonance Spectrometer. **Étude théorique d'un spectromètre à résonance ionique.** J. Amoignon and G. Rommel. *Vide*, v. 12, no. 7, Sept.-Oct. 1957, p. 377-382.

Particles moving in the *oxy*-plane. Direction of the emission. Effect of initial speed. Deflection of ions and rectification. Structure of the spectrometer; non-uniform electric field between two electrodes; electrical lens.

8905* (German.) Development of Cu- and/or Ti-Containing Alnico Magnets Satisfying Modern High Quality Requirements. **Die Entwicklung der kupfer- und/oder titanhaltigen Alnico-Magnete zum heutigen Gütestand.** Wilhelm Zumbusch. *Zeitschrift für Metallkunde*, v. 49, no. 1, Jan. 1958, p. 1-8.

Alnico magnets were improved by additions of Ti. Later their magnetic properties were further improved by gradual annealing. Recently materials were manufactured by melting or by sintering techniques which reach energy products of $4 \cdot 10^4$ Gs·Oe.

8906* (German.) Dichroism and the Luminescence Polarization on Stretched Polyvinyl Alcohol Foils. **Dichroismus und Lumineszenzpolarisation an verstreckten Polyvinylalkohol-Folien.** W. Hanle, H. Kleinpoppen, and A. Scharmann. *Zeitschrift für Naturforschung*, v. 13a, no. 2, Feb. 1958, p. 64-72 + 2 plates.

The mean orientation angle can be derived from the luminescence polarization as a standard for the orientation of the amorphous areas of PVA foils.

8907* (German.) The Behavior of Plane Ultrasonic Waves in Homogeneously Magnetized Monocrystals. **Das Verhalten von ebenen Ultraschallwellen in homogen magnetisierten Einkristallen.** Gerhard Simon. *Zeitschrift für Naturforschung*, v. 13a, no. 2, Feb. 1958, p. 84-89.

Elastic vibrations generate variable magnetic fields in homogeneously magnetized ferromagnetic monocrystals which react upon elastic waves, and lead to a dependence of the velocity of wave propagation on the magnetic condition of the monocrystal and to wave attenuation.

8908* (English.) **The Determination of the Lorenz Number at High Temperatures.** M. R. Hopkins and R. Ll. Griffith. *Zeitschrift für Physik*, v. 150, no. 3, 1958, p. 325-331.

Experiments with Pt and Pd.

8909* (Russian.) Investigation of the Temperature Dependence of Total Polarization, Coercive Force and Hysteresis Losses of $(Ba,Sr)TiO_3$, $Ba(Ti,Sn)O_3$, and $Ba(Ti,Zr)O_3$ Polycrystalline Solid Solutions. **Issledovanie temperaturnoi zavisimosti polnoi poliarizatsii, koertsitivnoi sily i poter'na gisterezis polikrstallcheskikh tverdykh rastvorov $(Ba,Sr)TiO_3$, $Ba(Ts,Sn)O_3$, i $Ba(Ti,Zr)O_3$.** V. A. Bokov. *Zhurnal Tekhnicheskoi Fiziki*, v. 28, no. 1, Jan. 1958, p. 77-86.

Spontaneous polarization of these solid solutions decreases with decrease in amount of $BaTiO_3$. Responses to $SrTiO_3$.

See also: **8343** (high speed photo shutters); **8413** (heat transfer); **8646** (spectroscopic analysis of binary alloy evaporation); **8795** (optical model of high neutron energy).

PLASTICS

8910 (Russian.) Study of Phosphoric-Organic Polymers. **Issledovanie v oblasti forfororganicheskikh polinurov. II.** Polycondensation of Di-β-Chlorethyl Ethers of Alkyl- and Arylphosphinic Acids. **Polikondensatsiia di-β-chloretilovykh efirov alkil- i arilfosfinovykh kislot.** V. V. Korshak, I. A. Gribova, and V. K. Shitikov. *Akademiia Nauk SSSR, Izvestiia, Otdelenie Khimicheskikh Nauk*, 1958, no. 2, Feb., p. 210-216.

Polycondensation results in the formation of dichlorethane and polymer, which at 250 C undergoes thermic degradation and forms methylphosphinic acid and acetaldehyde. Along with the polycondensation, formation of the cyclic ether occurs.

8911 (Russian.) Heterochain Polyamides. **Iz oblasti geterotsepnyhk poliamidov. VII.** Preparation of Polyamides and Polyamide Esters by Aminolysis of Polyesters. **Poluchenie poliamidov i polyamidoefirov putem aminoliza poliefirov.** V. V. Korshak, T. M. Frunze, and V. F. Petrova. *Akademiia Nauk SSSR, Izvestiia, Otdelenie Khimicheskikh Nauk*, 1958, no. 2, Feb., p. 217-220.

8912 (Russian.) Carbon-Chain Polymers and Copolymers. **Karbotsepnye polimery i sopolimery. I.** Synthesis and Polymerization of 4-Alkoxystrenes. **Sinlez i polimerizatsiia 4-alkoksistirolov.** G. S. Kolesnikov and G. M. Pogosian. *Akademiia Nauk SSSR, Izvestiia, Otdelenie Khimicheskikh Nauk*, 1958, no. 2, Feb., p. 227-231.

Five 4-alkoxystyrenes were synthesized, among which 4-*n*-propoxystyrene, 4-*n*-butoxystyrene, and isoamiloxystyrene were prepared for the first time.

8913* (Russian.) Plastic Scintillators. **Plastmassovye stsintilliatory.** I. M. Rozman. *Akademiia Nauk SSSR, Izvestiia, Seriia Fizicheskaia*, v. 22, no. 1, Jan. 1958, p. 36-40.

Scintillators can be polymerized at 50 C with a catalyst; at 145 C without catalyst; and at 200 C without catalyst for 12-15 hrs.

8914* (Russian.) Scintillation Properties of Carbo- and Heterocyclic Compounds in Plastics. **Stsintilliatsionnaia effektivnost' karbo- i geterotsiklicheskikh soedinenii v plastmassakh.** N. A. Androva, M. M. Koton, Iu. N. Panov, and F. S. Florinskii. *Akademiia Nauk SSSR, Izvestiia, Seriia Fizicheskaia*, v. 22, no. 1, Jan. 1958, p. 41-43.

Substituted anthracenes, polyphenyls, aryl derivatives of dienes, and several heterocyclic compounds such as oxazoles and oxydiazoles were studied in polystyrene.

8915 Lead Tetraethyl as Initiator for Polymerization Reactions. C. S. Marvel and R. G. Woolford. *American Chemical Society, Journal*, v. 80, Feb. 20, 1958, p. 830-835.

Polymerizations of acrylonitrile were accomplished with lead tetraethyl and lead tetraethyl-titanium tetrachloride catalysts. The latter was effective in certain cases where the former was not.

8916 The Preparation of Polymers and Copolymers From Vinyl Pyrimidines and Triazines. C. G. Overberger and Francis W. Michelotti. *American Chemical Society, Journal*, v. 80, Feb. 20, 1958, p. 988-991.

Preparation of 4,6-diamino-2-vinyl-*s*-triazine and its homopolymerization and copolymerization with methyl vinyl ketone, 2-N, N-dimethylamino-4-vinylpyrimidine, and 4-vinylpyrimidine by radical catalysis.

8917 The Molecular Weight of Polyvinyl Acetate. A. F. Sirianni, R. Tremblay, and I. E. Puddington. *Canadian Journal of Chemistry*, v. 36, Mar. 1958, p. 543-549.

The molecular weights of a series of unfractionated polyvinyl acetates of mol. wt. range 5000 to 40,000 were measured by determining the lowering of the vapor pressure of their solutions.

8918 Highly Ordered ('Isotactic') Structure Gives Polypropylene an Unusual Combination of Properties. *Chemical Processing*, v. 21, Mar. 1958, p. 114-116.

Advantages of "Moplen" include high mechanical strength, clarity of films; 330 F melting point, no environmental stress cracking, excellent vapor barrier, and all other advantages of polyethylene.

8919* (German.) Chemical Reactions in Synthetic Polymers. **Chemische Umsetzungen an synthetischen Polymeren.** W. Kern. *Chemiker-Zeitung*, v. 82, no. 3, Feb. 5, 1958, p. 71-77.

Macromolecular substances, inaccessible through direct polymerization or polycondensation, are obtained by reactions within the synthetic polymers.

8920* (German.) Fluon. **Fluon.** F. Kirchhof. *Chemiker-Zeitung*, v. 82, no. 3, Feb. 5, 1958, p. 79.

Mechanical, thermal, and electrotechnical properties of this poly-tetrafluorethylene, and its applicability in electrical engineering and chemical industry.

8921* (Italian.) Kinetics of Propylene Polymerization With Highly Stereospecific Heterogeneous Catalysts. **Cinetica della polimerizzazione del propilene con catalizzatori eterogenei ad elevata stereospecificità. III.** Chain Rupture Processes Depending on Catalyst Concentration. **Processi di rottura delle catene dipendenti dalla concentrazione del catalizzatore.** G. Natta, I. Pasquon, and E. Giachetti. **IV.** Influence of Temperature and Pressure on the Kinetics of Polymeric Chain Growth and Rupture. **Influenza della pressione e della temperatura sulla cinetica dei processi di accrescimento e di rottura della catene polimeriche.** G. Natta, I. Pasquon, E. Giachetti, and F. Scalarai. *Chimica e l'Industria*, v. 40, no. 2, Feb. 1958, p. 97-111.

8922 Size and Composition Distributions in Block Copolymers Prepared by the Tertiary Base Method. C. H. Bamford and E. F. T. White. *Faraday Society, Transactions*, v. 54, pt. 2, Feb. 1958, p. 278-286 + 1 plate.

8923 Epoxidation of Liquid Polybutadiene. Charles E. Wheelock. *Industrial and Engineering Chemistry*, v. 50, Mar. 1958, p. 299-304.

Coating formulations based on epoxidized liquid polybutadiene cure rapidly to form films of superior chemical resistance.

8924 Effects of Radiation on Plastic Packaging Films. H. G. LeClair and W. H. Cobbs, Jr. *Industrial and Engineering Chemistry*, v. 50, Mar. 1958, p. 323-326.

Film properties are practically unaffected by exposure to 1-3 Mrep. of radiation; larger exposures can seriously degrade film properties. Polyethylene film is unique in showing property improvement at higher exposure levels.

8925 Bonding of Teflon. Edward R. Nelson, T. J. Kilduff, and A. A. Benderly. *Industrial and Engineering Chemistry*, v. 50, Mar. 1958, p. 329-330.

Process for rendering Teflon bondable with ordinary adhesives involves immersion of the polymer in a solution of sodium-naphthalene complex in tetrahydrofuran.

8926* (Russian.) On the Properties of a Number of Vinyl Esters. **O svoistvakh riada slozhnykh vinilovykh efirov. I.** Polymerization and the Rates of Monomer Saponification. **O polimerizatsii i skorosti omyleniia monomerov.** E. N. Rostovskii, S. N. Ushakov, and A. N. Barinova. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk*, 1958, no. 1, Jan., p. 59-63.

Effect of acyl radical structure on rate of polymerization, and kinetics of hydrolysis of these esters. The effect of size and structure of side groups of polymers on their vitrification temperatures is similar for vinyl esters, acrylates, and methacrylates.

8927 Studies on the Sorption of Moisture by Polymers. II. The Cellulose-Cellulose Acetate System. D. K. Beever and L. Valentine. *Journal of Applied Chemistry*, v. 8, pt. 2, Feb. 1958, p. 103-107.

Adsorption isotherms at 22 C of water vapor for a series of homogeneously deacetylated cellulose acetates were determined.

8928* Anelastic Creep of Polymethyl Methacrylate. O. D. Sherby and J. E. Dorn. *Journal of the Mechanics and Physics of Solids*, v. 6, no. 2, 1958, p. 145-162.

Deformation of the above over the temperature range 263 to at least 410 K is entirely anelastic. Between 263 and 320 K the activation energy for creep is independent of the strain, but decreases linearly with an increase in applied creep stress. Above 320 K the activation energy for creep increases rapidly with increasing temperature.

8929* Irradiation Effects in Plexiglas. Bernhard Gross. *Journal of Polymer Science*, v. 27, Jan. 1958, p. 135-143.

Samples of methyl methacrylate were irradiated with 2 m.e.v. electrons.

8930* Infrared Spectra of High Polymers. VI. Polystyrene. C. Y. Liang and S. Krimm. *Journal of Polymer Science*, v. 27, Jan. 1958, p. 241-254.

8931* Polymers and Copolymers of Sodium Ethylenesulfonate. David S. Breslow and Abraham Kutner. *Journal of Polymer Science*, v. 27, Jan. 1958, p. 295-312.

Sodium ethylene sulfonate polymerizes readily in aqueous solution under the influence of ultra-violet light or in the presence of peroxide catalysts. The most important variable in the polymerization is the concentration of monomer, increased concentration leading to more rapid polymerization and higher molecular weights.

8932* Copolymerization of Vinylene Carbonate With Vinyl Thiolacetate and *N,N,N*-Triethyl-*N*-[2-(Methacryloxy) ethyl]ammonium Iodide With 4-Vinylpyridine. C. G. Overberger, H. Biletch, and R. G. Nickerson. *Journal of Polymer Science*, v. 27, Jan. 1958, p. 381-390.

8933* Diffusion of Allyl Chloride in Polyvinyl Acetate. I. The Steady State of Permeation. II. The Transient State of Permeation. P. Meares. *Journal of Polymer Science*, v. 27, Jan. 1958, p. 391-418.

8934* Studies on Straining of High Polymer Solids. Katsuhiko Ito. *Journal of Polymer Science*, v. 27, Jan. 1958, p. 419-431.

Straining is investigated from the standpoint of internal molecular structure on epoxy cast resins as network polymers and hard PVC as linear polymers.

8935* Polymers and Group Interactions. VI. Intramolecular Acylations on Copolymers of Styrene and Acrylic Acid Derivatives, a Route to Poly-2,4-Methylenetetralone. Ph. Teyssié and G. Smets. *Journal of Polymer Science*, v. 27, Jan. 1958, p. 441-457.

8936* Polymerization of Triallyl Cyanurate. Bert H. Clampitt, Dale E. German, and Joseph R. Galli. *Journal of Polymer Science*, v. 27, Jan. 1958, p. 515-522.

8937* (Russian.) Relation Between the Refractive Index and Structure of Polymers of the Divinyl Series. **O zavisimosti mezhdu pokazatelem prelomleniia i strukturoi polimerov uglevodorodov riada divinila.** K. B. Piotrovskii and D. E. Sterenzat. *Kauchuk i Rezina*, v. 16, no. 11, Nov. 1957, p. 1-3.

Studies the possibility of determining the structure of polymers according to the number of additions at the 1, 2, position for divinyl, and the sum of additions in positions 1, 2, and 3, 4, for polymers of isoprene.

8938* (Russian.) Investigation of the Suspension Polymerization of Styrene. **Issledovanie protsessa suspenzionnoi polimerizatsii stirola.** A. A. Berlin and I. M. Gil'man. *Khimicheskaia Promyshlennost'*, 1957, no. 8, Dec., p. 449-452.

Optimal conditions of polymerization and their effect on physical-mechanical and electro-insulating properties of styrene. Development of the "block-suspension" method of polymerization.

8939* (German.) Comparative Dielectric and Mechanical Measurements at 2 Mc. of Some Softened High Polymers. **Vergleichende dielektrische und mechanische Messungen bei $2 \cdot 10^6$ Hz an einigen weichgemachten Hochpolymeren.** H. Thurn and F. Würstlin. *Kolloid Zeitschrift*, v. 156, no. 1, Jan. 1958, p. 21-27.

Loss measurement in systems like polyvinyl chloride + di-n-butyl phthalate, polyvinyl acetate + di-n-butyl phthalate, and polyvinyl acetate + benzyl benzoate in the entire concentration range.

8940* (German.) The Effect of Long-Chain Branching on the Temperature and Form of the Dielectric, Mechanical and Dynamic Principal Maximum of Loss of Polyvinyl Acetate at 2 Mc. **Der Einfluss langkettiger Verzweigungen auf Temperaturlage und Form des dielektrischen und mechanisch-dynamischen Verlusthauptmaximums von Polyvinylacetat bei der Frequenz $2 \cdot 10^6$ Hz.** O. Fuchs, H. Thurn, and K. Wolf. *Kolloid Zeitschrift*, v. 156, no. 1, Jan. 1958, p. 27-29.

Form, height, and half-width of the loss maxima do not depend upon the extent of ramification.

8941* (German.) High Vacuum Infra-Red Spectrum of Condensed Derivatives of Polyethylene. **UR-Spektrum in Hochvakuum kondensierter Abbauprodukte des Polyäthylens.** K. H. Hellwege, R. Kaiser, and G. R. Lampe. *Kolloid Zeitschrift*, v. 156, no. 1, Jan. 1958, p. 29-31.

From an oven filled with polyethylene, molecules were evaporated in a high vacuum and condensed on a NaCl tablet between −180 and +150 C. Spectrographic analyses were run for different temperatures of absorption intensities at 13.7 and 13.9 μ.

8942* (German.) Results of Investigations Into Methods of Joining High Pressure Polyethylene. **Ergebnisse von Klebuntersuchungen an Hochdruck-Polyäthylen.** Heinz Peukert. *Kunstoffe*, v. 48, no. 1, Jan. 1958, p. 3-10.

Experiments in joining polyethylene to polyethylene as well as to other unrelated materials using various methods. Since the adhesive forces are produced especially by the polar molecular groups, plastics such as polyethylene, whose surfaces do not show polar tendencies, must be surface treated before they can be effectively joined.

8943* (Russian.) Analysis of the Infra-Red Absorption Spectra of Polyethylene as Related to the Problem of Intermolecular Interaction. **Izuchenie infrakrasnykh spektrov pogloshcheniia polietilena v sviazi s voprosom o mezhmolekuliarnom vzaimodeistvii.** I. I. Novak. *Leningrad. Universitet. Vestnik*, v. 12, no. 22, 1957, p. 43-50.

Investigations were carried out near the frequencies of 1960 and 720 cm^{-1} at different temperatures and for various degrees of stretching.

8944* (German.) A Study of the Branching of Polyvinylacetate. **Zur Verzweigung von Polyvinylacetat. II.** H.-G. Elias and F. Patat. *Makromolekulare Chemie*, v. 25, nos. 1-2, 1957, p. 13-40.

Hydrodynamic and thermodynamic properties of 15 fractions from 6 different polyvinylacetates were determined at 25 C in 2-butanone by measurements of osmotic pressure, light scattering, sedimentation, diffusion, and viscosity.

8945* (German.) The Surface Grafting of Polyvinylpyrrolidone With Acrylonitrile Under the Effect of Co-60-Gamma Rays, and the Swelling Properties of the Products Formed. **Die Oberflächen-Pfropfung von Polyvinylpyrrolidon mit Acrylnitril unter dem Einfluss von Co-60-Gamma-Strahlen, und die Quellungseigenschaften der gebildeten Produkte.** Arnim Henglein and Wolfram Schnabel. *Makromolekulare Chemie*, v. 25, nos. 1-2, 1957, p. 119-133.

8946 How Polyether Foams Compare. M. J. Sanger, G. T. Gmitter, and E. M. Maxey. *Materials in Design Engineering*, v. 47, Mar. 1958, p. 101-103.

Physical and chemical properties of polyether cushioning material are compared with those of adipic polyester foams.

8947* (English.) **On the Effect of High Energy Radiation to Polymers. I. Cross-Linking and Degradation.** Osamu Saito. *Physical Society of Japan, Journal*, v. 13, no. 2, Feb. 1958, p. 198-206.

Integro-differential equations are obtained, which describe the variation of mol.wt. distributions in a polymer caused by irradiation. The solutions of these equations give the gel point and average mol. wt.

8948* (German.) The Dissolving Capacity of Softeners. **Das Lösevermögen der Weichmacher.** K. Thinius. *Plaste und Kautschuk*, v. 5, no. 1, Jan. 1958, p. 3-5.

Determining the dissolving rate of a polymer in the softening agent. Measuring the viscosity of the resulting solution and its dilution value. Grouping the softeners according to their dissolving capacity in the case of cellulose derivatives.

8949* (German.) Low-Viscosity Cast Resins Based on Epoxide Compounds. Preparation, Treatment, Properties, and Applications. **Niedrigviskose Giessharze auf Basis von Epoxydverbindungen. Herstellung, Verarbeitung, Eigenschaften und Anwendungen.** H. Jahn. *Plaste und Kautschuk*, v. 5, no. 1, Jan. 1958, p. 6-12.

8950* (German.) Factors Influencing the Mechanical Properties of Manually Heat-Sealed PVC Hard Resin. **Faktoren, die mechanischen Eigenschaften des handgeschweissten PVC-hart-Materials beeinflussen.** A. Herrmann. *Plaste und Kautschuk*, v. 5, no. 1, Jan. 1958, p. 13-15.

Effect of temperature of the hot air, distance maintained between the nozzle and the sealing area, pressure applied to the additive ingredient, and the angle of application. Formation of the edges; mechanic properties of the compounds. Human factors.

8951* (Dutch.) New Plastics. **Nieuwe Kunststoffen. I.** H. A. K. Eden. *Plastica*, v. 11, no. 2, Feb. 1958, p. 122-128.

A study of the new trends in plastics. Structural and spatial construction of the macromolecule. Determination of the mechanical behavior by a spatial representation with time, temperature, and one mechanical property as coordinate.

8952 Polypropylene. *Plastics*, v. 23, Feb. 1958, p. 41-45.

Properties, methods of fabrication, and actual and potential applications of "Moplen", or "isotactic" polypropylene, produced by stereospecific polymerization of propylene.

8953 Reinforced Thermoplastic Sheet. J. V. Eurich. *Plastics*, v. 23, Feb. 1958, p. 51-52.

A new material resembling woven fabric embedded in plastic film to confer high strength characteristics.

8954 Measuring the Abrasion Resistance of Plastic Lenses for Sunglasses. P. M. Kamath and H. O. Buzzell. *Plastics Technology*, v. 4, Feb. 1958, p. 132 + 5 pages.

Results of laboratory tests, using a new type of abrader, give good correlation with field tests for comparing different plastic lens coatings.

8955* (French.) Nuclear Magnetic Resonance Spectrometry as Applied to the Study of High Polymers. **La spectrométrie de résonance magnétique nucléaire, application a l'étude des hauts polymères.** J. C. Danjard. *Revue Générale du Caoutchouc*, v. 35, no. 1, Jan. 1958, p. 51-54.

Reviews the basic assumptions on which this method is based. Highly useful investigations are possible on vulcanization transitions, reinforcement, crystallization, and characteristics of the structural groups.

8956 Radiation Reactions of Unsaturated Polyesters. A. Charlesby, V. Wycherley, and T. T. Greenwood. *Royal Society, Proceedings*, v. 244, ser. A, Feb. 25, 1958, p. 54-71.

The effect of both low- and high-intensity radiation, additives, oxygen, and temperature was studied to show that polymerization proceeds via a free-radical chain mechanism, although the poly-addition chain lengths produced seem to be very short.

8957* Methods for Joining Plastics Parts. A. J. Cheney and W. E. Ebeling. *SPE Journal*, v. 14, Mar. 1958, p. 31-39.

Blind riveting, press fitting, induction welding, and spin welding techniques and applications.

8958* Graft Polymerization on Polyethylene. H. George Hammon. *SPE Journal*, v. 14, Mar. 1958, p. 40-42.

Soft X-rays in graft copolymerization permit the economical treatment of thin sections, or of altering mainly the surface of thicker sections. Studies in which acrylonitrile, vinyl acetate, and vinyl pyrrolidone were grafted to polyethylene film are summarized.

8959* (Norwegian.) PVC — Production and Uses. **PVC — fremstilling og anvendelser.** Ingvar Lossius. *Tidsskrift for Kjemi, Bergvesen og Metallurgi*, v. 18, no 1, 1958, p. 1-8.

Survey of plastic production in Western countries. Polymerization and free radical polymerization. Emulsion and suspension polymers. Resistance to corrosion. Effect of heat and solar light.

8960* (Russian.) Orientation Studies in High Polymers. **Issledovanie orientatsii v vysokopolimerakh. III.** The Effect of Orientation on the Softening Temperature of Amorphous Polymers. **Vliianie orientatsii na temperatury steklovaniia amorfnykh polimerov.** Iu. S. Lipatov, V. A. Kargin, and G. L. Slonimskii. *Zhurnal Fizicheskoi Khimii*, v. 32, no. 1, Jan. 1958, p. 131-134.

Oriented and non-oriented polystyrene and polymethyl methacrylate specimens were studied.

8961* (Russian.) Synthesis, Properties, and Polymerization of α-Chloroacrylamide. **Sintez, svoistva i polimerizatsiia α-khlorakrilamida.** S. S. Ivanov and M. M. Koton. *Zhurnal Obshchei Khimii*, v. 28, no. 1, Jan. 1958, p. 139-143.

8962* (Russian.) Molded Unsaturated Polyester Resins That Can Harden at Low Temperature. **Litye nenasyshchennye poliefirnye smoly, otverdevaemye na kholodu.** R. K. Gavurina, P. A. Medvedeva, and Sh. G. Ianovskaia. *Zhurnal Prikladnoi Khimii*, v. 31, no. 1, Jan. 1958, p. 116-124.

Synthesis of polyethylene-glycol-maleic-phthalates, derivatives of adipic and sebacic acids, and study of curing conditions.

8963* (Russian.) Investigation of Catalytic Polymerization of Diene Hydrocarbons by Means of Molecular-Weight Distribution of Polymers. **Issledovanie kataliticheskoi polimerizatsii dienovykh uglevodorodov s pomoshchiu molekuliarno-vesovykh raspredelenii polimerov.** S. E. Bresler, A. A. Korotkov, M. I. Mosevitskii, and I. Ia. Poddubnyi. *Zhurnal Tekhnicheskoi Fiziki*, v. 28, no. 1, Jan. 1958, p. 114-131.

An approximate method of calculating the distribution of polymer. Experimental data obtained during solution polymerization of polyvinyl and polyisoprene.

8964* (Russian.) Investigation of Molecular Interaction by the Method of Effective Dipole Moments in Some Glass-Like Polymers. **Issledovanie molekuliarnykh vzaimodeistvii metodom effektivnykh dipol'nykh momentov v nekotorykh stekloobraznykh polimerakh.** *Zhurnal Tekhnicheskoi Fiziki*, v. 28, no. 1, Jan. 1958, p. 132-136.

Dipole-radical polymerization of polymethylmethacrylate and some of its homologs indicates that thermal movement of the polar radicals in vitreous condition is strongly retarded by C atom chains.

See also: **7831** (oxide catalysts and polyethlene); **7892** (α-glycol in epoxy resins); **7976** (melamine and derivatives); **7992** ($LiAlH_4$ reduction of polymethyl methacrylate); **8214** (irradiation and electrical properties of mylar); **8365** (high-speed tension testing machine); **8442** (Li polymerization catalyst); **8608** (Vickers hardness of nylon); **8763** (radiation damage in plastic scintillators); **8863** (birefringence in flowing polystyrene solutions).

POLLUTION AND WASTES

8965* Ohio River Water Quality and Flow. Edward J. Cleary and David A. Robertson, Jr. *American Water Works Association, Journal*, v. 50, Mar. 1958, p. 399-409.

8966* (German.) The Optical Properties of Iron-Oxide Fumes. **Die Optischen Eigenschaften von Eisenoxydrauch.** Werner Pepperhoff and Cord Passow. *Archiv für das Eisenhüttenwesen*, v. 29, no. 2, Feb. 1958, p. 77-82.

Absorption and scattering of radiation evaluation of radiation curves obtained with various methods.

8967 The Disposal of Radioactive Waste on Land. Report of the Committee on Waste Disposal of the Division of Earth Sciences. 142 pp. 1957. National Academy of Sciences-National Research Council, Washington, D.C. (TD897 N21.28d Over.)

A report on recent studies.

8968 Report New Method for Studying Air Pollution. H. Gardner Bourne, Jr. *Heating, Piping & Air Conditioning*, v. 30, Mar. 1958, p. 139-141.

Procedure includes use of portable electrostatic air sampler and polyethylene canisters. Measurements were made of the contaminants from a ferromanganese plant.

8969* (Czech.) Treatment of Waste Waters of the Metallurgical Industry. **O úpravě odpadních vod hutního průmyslu.** Eugen Zamrzla. *Hutnické Listy*, v. 13, no. 2, Feb. 1958, p. 133-140.

Deterimental influence of industrial waste waters and technological measures to influence the quantity and quality of these waters. It may be necessary to change over to the circulating system of water supply. Since water pumping costs are high, one should check the water consumption as well as the efficiency of clearing and cooling equipment.

8970* Atomic Energy Program, for Waste Disposal. I. Conrad P. Straub. *Industrial Wastes*, v. 3, no. 2, Mar.-Apr. 1958, p. 42-45.

The problems encountered, some of the methods used for disposal, and the sources of gaseous, airborne, liquid, and solid radioactive waste materials.

8971* Disposal of Toxic Wastes. C. M. Tarzwell. *Industrial Wastes*, v. 3, no. 2, Mar.-Apr. 1958, p. 48-52.

Discussion of the importance of bio-assays in the detection and evaluation of certain types of pollution.

8972* (German.) The Problem of "Keeping the Air Clean" With Special Consideration of Iron- and Steelworks. **Das Problem "Reinhaltung der Luft" unter besonderer Berücksichtigung der Eisenhütten-, insbesondere Stahlwerksbetriebe.** I. K. Guthmann. *Radex Rundschau*, 1958, no. 1, Jan., p. 3-30.

Air pollution and its origin; composition of dust and gases; dust deposition; measurement of dust deposits; grit deposited on iron and steelworks areas, in the country, city and industrial districts; fume of steelworks and exhaust gases; waste gas and ashes from oil burners. Odor control of waste gases; silicosis.

8973* Decomposition of Organic Wastes. A. Karim and M. U. Chowdhury. *Soil Science*, v. 85, no. 1, Jan. 1958, p. 51-54.

Compost should be made under aerobic conditions, with inoculum treatment, with a period of 90 days for decomposition. Lignin represented the smallest loss, fats and waxes the greatest, and cellulose and furfural were an intermediate loss.

8974* (German.) Measurement of the Content of Radioactive Suspended Substances in Fresh Air. **Über die Messung des radioaktiven Schwebstoffgehaltes der Atemluft.** D. Hasenclever. *Staub*, v. 18, Feb. 1958, p. 44-49.

By the use of high grade cellulose-asbestos fiber filters, which have precipitating efficiency of more than 99.9% over the entire particle size range of 0.3μ up to 10μ diameter of interest in industrial hygienics, it is possible, to suck the quantity of air necessary to trace $10^{-12}\mu$ C/cm^3 through the filter in two hours or less.

8975 Balloon Borne Air Sampling Apparatus. Charles W. Chagnon. *U. S. Air Force, Cambridge Research Center, Instrumentation for Geophysical Research, No. 6*, Apr. 1957, 21 pp. (QC806 Un3i Contin.)

A balloon-borne air sampling apparatus for the analysis of gases in the upper atmosphere is described. By the use of selective chemical absorbents to perform the initial stages of the air analysis "in situ", the problems of sample collection and transportation are minimized.

8976 Detection of Air-Borne Beryllium Dust. R. Gold and C. A. Stone. *U. S. Atomic Energy Commission, AECU-3505*, Apr. 25, 1957, 76 pp. (UF767 U3au Contin.)

Detection of filter paper deposits of Be in the microgram range is accomplished by utilizing the $Be^9(\alpha,a)\ C^{12}$ interaction. The fast neutron yield of this interaction is also accompanied by a 4.5 m.e.v. γ-transition. Thus neutron or γ-detection may serve as a variable in determining the amount of Be in any given deposit.

8977 Calculations on Environmental Consequences of Reactor Accidents, Interim Report. J. W. Healy. *U. S. Atomic Energy Commission, HW-54128*, Dec. 11, 1957, 50 pp. (UF767 Un3.1hw Contin.)

Calculations of the exposure downwind from the release of one curie from a ground source and a 200 meter high source were performed for emission into a strong inversion, moderate inversion, neutral and unstable conditions with wind speeds of one, five, and ten meters per second.

8978* (German.) The Discharge of Dust and Gas From Steam Generators, and Its Distribution in Air. **Der Staub- und Gasauswurf aus Dampferzeugern und seine Verteilung in der Atmosphäre.** Karl Schwarz. *VDI Zeitschrift*, v. 100, no. 8, Mar. 11, 1958, p. 331-332.

Approaches the problem of air pollution through combined measurements of precipitation and wind.

See also: **7828** (aerosol particle size); **7898** (ultramicrodetermination of NO_2 in air); **7919** (reducing sugars in sulphite waste liquors); **8335** (particle size distribution of airborne mine dust).

RUBBER AND ELASTOMERS

8979 Soviet Synthetic "Natural" Rubber—Papers Summarised. *Chemical Age*, v. 79, Feb. 15, 1958, p. 316.

Russian isoprene or SKI resembles natural rubber fairly closely in its elastic properties and SKI-based tires should last several times as long as those based on butadiene-styrene rubber. Characteristics and production are briefly summarized.

8980* Polymerisation of Admixed Monomers by the Cold Mastication of Rubber. D. J. Angier, E. D. Farlie, and W. F. Watson. *Institution of the Rubber Industry, Transactions*, v. 34, Feb. 1958, p. 8-19.

Polymeric free radicals produced by rupture of rubber molecules during cold mastication are utilized under O-deficient conditions to initiate the polymerization of monomers incorporated in the rubber.

8981* Ozone Resistance of Natural Rubber Vulcanisates. I. Apparatus for Exposure at Low Ozone Concentration. B. I. C. F. Van Pul. *Institution of the Rubber Industry, Transactions*, v. 34, Feb. 1958, p. 28-36.

An apparatus is described for evaluating the cracking resistance of rubber specimens exposed under static or dynamic conditions to ozone concentrations between 5 and $50x10^{-8}$ ml./ml. of air and from 20 to 100 C.

8982* Crystallinity and Orientation in Silicone Rubber. I. X-Rays Studies. Stanley M. Ohlberg, Leroy E. Alexander, and E. I. Warrick. **II. Physical Measurements.** E. L. Warrick. *Journal of Polymer Science*, v. 27, Jan. 1958, p. 1-38.

A technique for quantitatively examining the diffraction pattern of polydimethylsiloxane at and below room temperature with the X-ray diffractometer. Density and temperature-tension data.

8983* Crosslink Density in Polybutadiene. L. H. Howland, A. Nisonoff, L. E. Dannals, and V. S. Chambers. *Journal of Polymer Science*, v. 27, Jan. 1958, p. 115-128.

The crosslink density was determined by measurement of the polymer mol. wt. by osmometry and the primary chain mol. wt. by modifier analysis involving radioactive materials.

8984* (Russian.) Vulcanization Accelerators—Derivatives of Triethanolamine. **Uskoriteli vulkanizatsii—proizvodnye trietanolamina.** V. G. Epshtein, B. N. Kholodkovskii, M. A. Poliak, and A. I. Bakharev. *Kauchuk i Rezina*, v. 16, no. 11, Nov. 1957, p. 15-21.

Synthesis and properties of accelerators called "trika", "trietal", and "kietal". Butadiene-styrene rubber base, sodium-butadiene rubber base, and natural rubber were tested with these accelerators.

8985* (Russian.) Study of the Mechanism of Rupture of Vulcanizates. **Issledovanie mekhanizma razryva vulkanizatov.** V. E. Gul', G. P. Krutetskaia, and V. V. Kovriga. *Kauchuk i Rezina*, v. 16, no. 12, Dec. 1957, p. 1-7.

Dependence of kinetics of rupture growth on size of rupture, rate of deformation, and specific cohesive energy of vulcanizates was studied.

8986* (Russian.) Structure and Properties of Soft High Polymers of the Rigid Divinylstyrene Rubbers. **Struktura i svoistva miagkikh termoplastikatov zhestkikh divinilstirol'nykh kauchukov.** L. M. Begunovskaia and B. K. Karmin. *Kauchuk i Rezina*, v. 16, no. 12, Dec. 1957, p. 7-11.

8987* (Russian.) The Use of Radioirradiation for Evaluation of the Homogeneity of Rubber Mixtures. **Ispol'zovanie radioaktivnogo izlucheniia dlia otsenki odnorodnosti rezinovykh smesei.** D. B. Boguslavskii, B. P. Tikhomirov, and A. I. Bakharev. *Kauchuk i Rezina*, v. 16, no. 12, Dec. 1957, p. 24-27.

Method for evaluation of the homogeneity of ingredients in mixtures is based on determination of the deviations of the linear absorption coefficient from its average value.

8988* (Russian.) Controlling Rubber Mixtures by a Luminescent Method. **Liuminestsentnyi metod kontrolia rezinovykh smesei.** M. L. Berman and V. I. Rachkulik. *Kauchuk i Rezina*, v. 16, no. 12, Dec. 1957, p. 33-36.

Method can be used for determining the purity and grade of rubber mixtures and ingredients, detection of errors in rubber mixtures, detection of stocks of unmixed ingredients and rubbers, and sorting rubbers and other materials that are externally similar.

8989* (German.) The Effect of Aging and Ozone Inhibitors on the Ozone Resistivity of Vulcanized Natural Rubber. **Über den Einfluss von Alterungs- und Ozonschutzmitteln auf die Ozonbeständigkeit von Vulkanisaten aus Naturkautschuk.** B. I. C. F. van Pul. *Kautschuk und Gummi*, v. 11, no. 2, Feb. 1958, p. 36WT-37WT.

8990 Properties and Applications of Urethane Rubber. R. H. Kittner. *Machine Design*, v. 30, Mar. 6, 1958, p. 118-124.

Load-carrying capacities; friction characteristics; general properties; applications; hardness and elasticity; abrasion resistance; oil resistance.

8991* (Russian.) The Propagation of Waves in Rubber. **K rasprostraneniiu vohn v rezine.** N. Kristesku. *Prikladnaia Matematika i Mekhanika*, v. 21, no. 6, Nov.-Dec. 1957, p. 795-800.

Dynamic deformation waves were studied in a rubber bar, which was statically stretched to a certain deformation and then dynamically and uniformly loaded.

8992* (French.) A New Form of Fatty Acids for Rubber. **Une nouvelle forme d'acide gras pour caoutchouc.** A. Uettwiller. *Revue Générale du Caoutchouc*, v. 35, no. 1, Jan. 1958, p. 31-33.

Fatty acids such as stearic are now basic ingredients of rubber compounds. In many cases, Utacide may be substituted with the amount reduced by 30 to 50% and other important advantages, such as absence of blooming and easier processing.

8993* (French.) Recent Advances in Synthetic Rubber Research. **Récents progrès dans la recherche sur les caoutchoucs synthétiques.** J. D. D'Ianni. *Revue Générale du Caoutchouc*, v. 35, no. 2, Feb. 1958, p. 155-156.

New "adduct" rubbers, produced by reaction of a diene polymer with a mercaptan. Development of a non-staining, non-discoloring oil-extended rubber. Fabrication of a 100% GRS latex foam rubber. New carbon black/GRS masterbatch.

8994* (French.) Longitudinal Tear in Stretched Vulcanizates. **Déchirement longitudinal des vulcanisats en extension. I.** Measuring Method and Preliminary Results. **Méthode de mesure et résultats préliminaires.** R. Chasset and P. Thirion. *Revue Générale du Caoutchouc*, v. 35, no. 2, Feb. 1958, p. 165-171.

8995 Elastomers for Use in Radiation Fields. III. Effects of Gamma Radiation on Elastomers Classified Chemically as Acrylic, Chlorosulfonated Polyethylene, Chloroprene, Nitrile and Styrene. Robert Harrington. *Rubber Age*, v. 82, no. 6, Mar. 1958, p. 1003-1015.

8996 Compounds for High Temperature Fuel Seals. E. J. Fujiwara, W. G. Lajiness, L. C. Smith, and R. C. Spain. *Rubber Age*, v. 82, no. 6, Mar. 1958, p. 1016-1020.

Testing and properties of suitable elastomers.

8997 Thermal Diffusivity of Butyl Rubber and Its Compounds. II. Application of Diffusivity Coefficients. Donald R. MacRae and R. L. Zapp. *Rubber Age*, v. 82, no. 6, Mar. 1958, p. 1024-1029.

How to apply coefficients to typical vulcanization problems such as temperature at the center of a slab.

8998 Oil Resistant Compositions From Nitrile and Acrylic Rubbers. S. Mottram and P. H. Starmer. *Rubber and Plastics Age*, v. 39, Feb. 1958, p. 120 + 3 pages.

Effect of polymerization and compounding variables on resistance to swelling.

8999* A Study of the Moisture Adsorption Properties of Carbon Blacks. I. E. M. Dannenberg and W. H. Opie, Jr. *Rubber World*, v. 137, no. 6, Mar. 1958, p. 849-855.

Data on channel blacks. (To be continued.)

9000* Equivalent Cures in Specimens of Various Shapes. F. S. Conant, J. F. Svetlik, and A. E. Juve. *Rubber World*, v. 137, no. 6, Mar. 1958, p. 856-859.

Nomographs for calculation of the lag or incubation time involved in curing articles of varying shapes and compositions, and for transposing cure times at one temperature to those at a different temperature. Methods for determining the state of cure.

9001* (Russian.) Influence of Interaction of Molecules, Cross-Linking and Temperature on the Destruction and Time Dependence of Strength of Rubber-Like Polymers. **Vliianie mezhmolekuliarnogo vzaimodeistviia, poperechnogo sshivaniia i temperatury na razrushenie i vremennuiu zavisimost' prochnosti kauchukopodobnykh polimerov.** G. M. Bartenev and L. S. Briukhanova. *Zhurnal Tekhnicheskoi Fiziki*, v. 28, no. 2, Feb. 1958, p. 287-295 + 1 plate.

The following non-crystallizing rubbers were studied: polybutadiene (SKB, SKBM), butadiene-styrene (SKS-10, SKS-30), and butadiene-nitrol (SKH-18, SKH-26, SKH-40).

See also: **7899** (photometric determination of ZnO in rubber); **7989** (alkylation of mercaptobenzothiazole); **8221** (silicone rubber insulation).

WELDING AND JOINING

9002* (Rumanian.) Diagrams for Determining Temperature Distribution in Time and Space of Weld Parts in Butt-Welding. **Diagrame pentru determinarea distributiei in timp si spatiu a temperaturii pieselor de sudat, la sudarea in capete.** T. Salagean and I. Salagean. *Academia Republicii Populare Romine. Baza de Cercetări Ştiinţifice Timişoara. Studdi şi Cercetări Ştiinţifice. Seria Ştiinţe Tehnice*, v. 4, nos. 1-2, Jan.-June 1957, p. 19-28.

Numerical tables were set up for metals and alloys used most in welding.

9003 High-Temperature Adhesives. C. N. Powis. *Aircraft Production*, v. 20, Mar. 1958, p. 88-92.

Developments in metal-to-metal bonding for conditions of high-speed flight.

9004* (German.) Shielded Arc Welding of Aluminum Materials. **Schutzgasschweissen der Aluminium - Werkstoffe.** *Aluminium Ranshofen, Mitteilungen*, v. 5, no. 1, Nov. 1957, p. 3-12.

Advantages of gas-shielded arc-welding compared with other welding methods.

9005 Fusion Welding of Titanium. I-II. *American Machinist*, v. 102, Mar. 24, 1958, p. 131 + 2 pages.

Mechanical properties of weldable Ti alloys. Precautions in welding. Power supply. Non-consumable and consumable electrode processes. Shielding. Back-up and chill bars. (To be continued.)

9006 Fluxless Process Simplifies Aluminum Soldering. Samuel Freedman. *Aviation Age*, v. 28, no. 9, Mar. 1958, p. 126-129.

Chemalloy solder, derived by "homogenizing", rather than merely blending, Zn and Pb, allows low-temperature fluxless soldering and welding of Al.

9007* (Russian.) Attainability of Equilibrium Between Slag and Metal During Welding and Beading. **O dostizhimosti ravnovesiia mezhdu shlakom i metallom pri svarke i naplavke.** I. I. Frumin. *Avtomaticheskaia Svarka*, v. 11, no. 1, Jan. 1958, p. 3-13.

Experimental study of composition of metal and slag using a flux that contains not more than 50% SiO_2, and not more than 90% of (SiO_2+MnO+FeO) with various types of weld wire and base metal. Calculation of equilibrium by means of formulas for acid slags. In several cases equilibrium was reached at 1700 C.

9008* (Russian.) The Effect of Alloying Elements on the Structure and Mechanical Properties of Welded Titanium Seams. **Vliianie legiruiushchikh elementov na strukturu i mekhanicheskie svoistva svarnykh shvov titana.** S. M. Gurevich. *Avtomaticheskaia Svarka*, v. 11, no. 1, Jan. 1958, p. 14-21.

Mechanical properties and microstructure of seams containing Al, Pb, V, Cr, Mo, Mn, Fe, and Cu in amounts up to 7%. The optimum composition of seams not subjected to thermal, α, or β-stabilizing elements was established.

9009* (Russian.) Some Problems of Welding Under Flux Straight-Seam Pipelines of Large Diameter Made From High Quality Steel. **Nekotorye voprosy svarki pod fliusom priamoshovnykh gazonefteprovodniykh trub bol'shogo diametra iz stalei povyshennoi prochnosti.** S. L. Mandel'berg and O. S. Zabarilo. *Avtomaticheskaia Svarka*, v. 11, no. 1, Jan. 1958, p. 56-62.

New method prevents formation of hot cracks, increases rate of welding, and lowers welding costs.

9010* (Russian.) Preparing the Surface of Articles for Cold Welding. **K voprosu o podgotovke poverkhnosti detalei k kholodnoi svarke.** I. B. Baranov. *Avtomaticheskaia Svarka*, v. 11, no. 1, Jan. 1958, p. 63-70.

The presence of an oxide film on Al does not interfere with cold welding, whereas the presence of organic materials makes welding impossible. Coatings of Cr or Ni on Cu have different sensitivities to organic substances during welding.

9011* (Russian.) Electroslag Welding of Chromium-Nickel Austenite Steels and Heat-Resistant Alloys Using Plate Electrodes. **Elektroshlakovaia svarka plastinchatym elektrodom khromonikelevykh austenitnykh stalei i zharoprochnykh splavov.** B. I. Medovar, Iu. V. Latash, and A. N. Safonnikov. *Avtomaticheskaia Svarka*, v. 11, no. 2, Feb. 1958, p. 9-19.

9012* (Russian.) The Structure and Properties of the Seam Zone in Welded Joints of 2 X 13 Steel. **O strukture i svoistvakh okoloshovnoi zony svarnykh soedinenii stali 2 X 13.** N. I. Kakhovskii. *Avtomaticheskaia Svarka*, v. 11, no. 2, Feb. 1958, p. 30-36.

When this steel is welded without preheating, a non-homogeneous structure develops in the area adjacent to the seam which consists of soft grains and acicular ferrite grains, that were exposed to a phase riveting. High-temperature (700-750 C) tempering is required to soften this metal.

9013 Primary Structure and Causes of Weld Hot Cracking of Chromansil-Type Steel. S. V. Avakyan and N. F. Lashko. *Henry Brutcher Translation No.* 3983, 12 p. (Abridged from *Avtogennoe Delo*, v. 21, no. 10, 1950, p. 13-16.) Henry Brutcher, Altadena, Calif.

Particulars on special etching agents used.

9014 Development of Structure of Welds in 18-8 and 25-20 Chrome-Nickel Steels by Electro-Polishing and Electroetching. A. A. Rossoshinskii. *Henry Brutcher Translation No.* 4059, 5 p. (From *Avtomaticheskaya Svarka*, v. 6, no. 6, 1953, p. 52-55.) Henry Brutcher, Altadena, Calif.

A method of preparing microsections of 18-8 and 25-20% Cr-Ni steel welds, with or without additions of Mo, Ti, Cb, Mg, and Si. Composition of electrolytes.

9015 How to Braze Stainless Steels. I. H. M. Webber. *Industrial Heating*, v. 25, Feb. 1958, p. 247 + 6 pages.

Use of base and filler metals; wetting action between them; fixtures for furnace brazing. (To be continued.)

9016 Three New Pore-Free Ways to Weld Aluminum. F. R. Baysinger. *Iron Age*, v. 181, no. 11, Mar. 13, 1958, p. 112-115.

Qualiweld. Econoweld, and Chlorecon processes combine special techniques with optimum combinations of shielding gas, provide better weld quality at lower cost.

9017* A Fundamental Investigation of Adhesion. II. Method for Measuring Shrinkage Stress in Restrained Gelatin Films. Richard C. Weatherwax, Beverly Coleman, and Harold Tarkow. *Journal of Polymer Science*, v. 27, Jan. 1958, p. 59-66.

Measurement of the uniform tensile stress acting in the plane of adhesive films.

9018 Dip Brazing of Aluminum. James W. Maston. *Light Metal Age*, v. 16, Feb. 1958, p. 8-11.

Techniques and limitations unique to the process; assembling the part; locating the braze; capillary action.

9019* (German.) Joining Aluminum to Copper by Sintering an Al-Cu Powder With a Liquid Phase. **Verbinden von Aluminium mit Kupfer über eine Sinterung von Al-Cu-Pulver mit flüssiger Phase.** F. Erdmann-Jesnitzer and A. Arnold. *Metall*, v. 12, no. 3, Mar. 1958, p. 179-185.

Ends of Al and Cu conductors were joined by sintering Al-Cu powder placed between them. Pressure, temperature, and sintering time are given.

9020* (German.) New Data and Progress in the Metallurgy of Welding Iron Materials. **Neue Erkenntnisse und Fortschritte auf dem Gebiete der Metallurgie des Schweissens von Eisenwerkstoffen. IV.** K. L. Zeyen. *Oerlikon Schweissmitteilungen*, v. 16, no. 29, 1958, p. 9-108.

9021* (German.) Welding of Heat Resisting Steels. **Schweissen hochwarmfester Stähle.** H. H. Weigand. *Schweissen und Schneiden*, v. 10, no. 2, Feb. 1958, p. 44-49.

Welding processes. Filler materials. Properties of the weld metal. Hot cracking in the deposited weld metal. Testing resistance to hot cracking.

9022* (German.) Experimental Investigation Into the Mechanism of Joining by Soldering. **Versuche zur Deutung der Bindevorgänge beim Löten.** J. Colbus. *Schweissen und Schneiden*, v. 10, no. 2, Feb. 1958, p. 50-54.

The mechanism of joining. Measurements. Joints of similar parent materials and filler metals. Strength tests. Temperatures during the joining process.

9023* (German.) The Inert-Gas Tungsten-Arc Welding of Thin Sheet Steel for Transformers and Dynamos. **Zur Wolfram-Inertschweissung dünner Transformatoren- und Dynamobleche.** J. Ruge and W. Rauchfuss. *Schweissen und Schneiden*, v. 10, no. 2, Feb. 1958, p. 55-58.

Execution of welding tests. Testing conditions. Influence of heat treatment. Hardness and strength tests. Electrical losses.

9024* (German.) Lime-Base Electrodes for High-Quality Weld Joints. **Kalkbasische Elektroden für hochwertige Schweissverbindungen.** Alfred Schmidt. *Schweisstechnik*, v. 11, no. 12, Dec. 1957, p. 143-150.

9025* (German.) Tests for Measuring the Working Temperatures During Hard-Soldering. **Versuche zur Messung der Arbeitstemperaturen beim Hartlöten.** J. Colbus. *Schweisstechnik*, v. 12, no. 1, Jan. 1958, p. 3-6.

The temperature at which the solder "seals" lies above the solidification point of the solder and the heat conductivity of the basic materials had no effect on it.

9026* (French.) Coated Electrodes for Deep Penetration Welding. Results of Studies Carried Out by the Institute of Welding. **Soudage à l'arc avec électrodes enrobées à forte pénétration. Résultats d'études faites à l'institut de soudure. I.** General Purpose of the Experimental Means Used. **But général de l'étude. Moyens expérimentaux mis en oeuvre.** A. Gaubert. **II.** Application of Statistical Methods in Experimental Investigations. **Utilisation des méthodes statistiques dans les recherches experimentales.** G. d'Herbemont. **III.** Results (Part I): Effect of Current and Geometric and Cinematic Variables on Penetration. **Résultats (1 partie): influence de l'intensité du courant et des paramètres d'ordre géométrique et cinématique sur la pénétration.** A. Gaubert. *Soudage et Techniques Connexes*, v. 12, nos. 1/2, Jan.-Feb. 1958, p. 5-24.

9027* (French.) Problems of Welding High Tensile Strength Structural Steels. **Problèmes posés par le soudage des aciers de construction à haute résistance.** H. J. Wiester. *Soudage et Techniques Connexes*, v. 12, nos. 1/2, Jan.-Feb. 1958, p. 25-30.

Raising the effect of precipitation of finely dispersed Al nitrides on the grain structure and the tensile properties of weldable structural steels by increasing the N content to about 0.030%. Application to basic converter process and to open-hearth steels.

9028 How to Weld Copper and Its Alloys. Lester F. Spencer. *Steel*, v. 142, Mar. 17, 1958, p. 110 + 4 pages.

Carbon arc and oxyacetylene rules and techniques.

9029* (Czech.) Slag Welding. **Svařování do strusky.** E. Praceus. *Strojírenská Výroba*, v. 6, no. 2, Feb. 1958, p. 76-78.

Experiences with new method of manual welding with coated electrodes and without removing slag between beads and layers. Selection of electrodes and welding technology. Improvement of slag control by weld positioning.

9030* (Czech.) Welding of Gray Iron. **Svařování šedé litiny.** R. Krňak. *Strojírenská Výroba*, v. 6, no. 2, Feb. 1958, p. 79-80.

Reasons for the poor weldability of gray iron. Selection of suitable welding methods which are divided into three basic groups according to their preheating range—hot welding: arc-, gas pressure-, thermit-, and fusion welding; medium hot welding: arc-, gas pressure-, and resistance flash welding; cold welding; arc welding.

9031* (Russian.) Calculation of Heating and Cooling of Rods in Resistance Butt Welding. **Raschet nagreva i okhlazhdeniia sterzhnei pri svarke vstyk soprotivleniem.** N. N. Rykalin and A. I. Pugin. *Svarochnoe Proizvodstvo*, 1958, no. 1, Jan., p. 1-6.

Experimental investigation and theoretical calculation of the heating process. Calculation of heat distribution along the rods at the time of the final stage of the welding, and of the thermal cycle during heating and cooling stages.

9032* (Russian.) Vibrating Arc Deposition on Electric Motor Spindles. **Vibrodugovaia naplavka valov elektrodvigatelei.** I. R. Patskevich, G. D. Kulikov, and M. A. Grishin. *Svarochnoe Proizvodstvo*, 1958, no. 1, Jan., p. 28-29.

Method of reconditioning spindles with a mechanical vibrator. Process technique.

9033* (Russian.) "Shanghai-57-1", the Ney Type of Electrode for Welding Structural Steel. **Novaia marka elektrodov "Shankhai-57-1" dlia svarki konstruktsionnoi stali.** Vei Ven-Lin. *Svarochnoe Proizvodstvo*, 1958, no. 1, Jan., p. 30-31.

A new type of electrode with coating prepared on a "marble-fluorspar" base, containing only small amount of ferroalloys. Coating composition, chemical composition of coating components, and chemical composition of electrode wire, base metal, and weld metal.

9034* (Russian.) Introduction of Aqueous Potassium-Chromates Into Electrode Coatings. **Vvedenie v elektrodnye pokrytiia vodnykh rastvorov khromovokislykh solei kaliia.** N. A. Gorpeniuk and A. V. Pechatnov. *Svarochnoe Proizvodstvo*, 1958, no. 1, Jan., p. 32.

9035* (Polish.) Metal Gluing. **Klejenie metali.** Tadeusz Wiślicki. *Technika Lotnicza*, v. 12, no. 6, Nov.-Dec. 1957, p. 175-183.

Control of the bonds formed by gluing; effect of temperatures and corrosion on the static resistance; fatigue resistance.

9036 Flux in Flame Finds Greater Applications. E. H. Conway. *Welding Engineer*, v. 43, Mar. 1958, p. 40-42.

Flame fluxing can cut brazing alloy casts up to 25%. No surface oxidation is possible because flux is automatically supplied.

9037 Filler Metals for Joining. XIV. Orville T. Barnett. *Welding Engineer*, v. 43, Mar. 1958, p. 66-68.

Data on Ni and Ni alloys.

9038 Schedules for Spot Welding Projection Hardware to Mild-Steel Sheet and Plate. O. K. Barnes, Jr. *Welding Journal*, v. 37, Mar. 1958, p. 207-219.

Deals with electrode requirements, welding-current values, electrode forces and cycles of weld time that have been experimentally determined for welding a wide variety of hardware-to-sheet-thickness combinations.

9039 Cupro-Nickel Welded With Aluminum Bronze. Vincent Abaravich. *Welding Journal*, v. 37, Mar. 1958, p. 220-224.

AWS-ASTM classification ECuAl-A2 electrodes can be successfully used with the inert-gas consumable-electrode process to eliminate weld-deposit cracking.

9040 Ultrasonic Welding of Structural Aluminum Alloys. J. Byron Jones and Florence R. Meyer. *Welding Journal*, v. 37, Mar. 1958, p. 81s-92s.

Investigation of the ultrasonic weldability of aircraft structural Al alloys and the effect of resistance heating as an auxiliary to such vibratory welding.

9041 Evaluation of the Kinzel Test From Its Fracture Characteristics. R. D. Stout, W. J. Murphy, and R. C. Westgren. *Welding Journal*, v. 37, Mar. 1958, p. 107s-113s.

Relates the observed effects of plate composition, welding conditions and heat treatment on transition temperature to changes in the ability of the various regions at or near the weld to initiate or resist cleavage fracture.

9042 Inert-Gas-Shielded Consumable-Electrode Welding of Molybdenum. N. E. Weare, R. E. Monroe, and D. C. Martin. *Welding Journal*, v. 37, Mar. 1958, p. 117s-124s.

Studies of arc stability and metal transfer in Mo arcs, and the immediate problems in adapting the inert-gas-shielded consumable-electrode process for Mo welding are discussed.

9043 Fatigue Characteristics of Single-Lap Joints of AISI 347 Brazed With a Ni-Cr-Si-B-C Alloy. R. G. Aspden and W. Feduska. *Welding Journal*, v. 37, Mar. 1958, p. 125s-128s.

Brazed specimens exhibit a fatigue endurance limit equivalent to the original annealed AISI 347 strip at room temperature, and about 10% lower than the unbrazed material at 1100 F.

9044 Inert-Gas Tungsten-Arc Welding SAE 4130 Steel Sheet. V. The Mechanism of Hot Cracking. C. A. Terry and W. T. Tyler. *Welding and Metal Fabrication*, v. 26, Mar. 1958, p. 103-110.

Transverse weld cracking probably occurs above solidus temperature, and arises from effects of constitutional metastability and contraction which impose strain on the almost solid weld.

See also: **7928** (analysis of welds); **8361** (welding bibliographies); **8525** (welding in blast furnace construction); **8588** (cold shortness of steel welds); **8619** (creep strength of steel welds); **8621** (Cu alloys for electric resistance welding electrodes); **8631** (strength of Al welds); **8632** (cracking of Ti welds); **8633** (vibration resistance of steel welds); **8634** (properties of large-section oxy-acetylene pressure welds); **8701** (fine structure and impact strength of welded seams); **8702** (structure of Ti welds); **8735** (non-uniformity of welded joints); **8751** (weld radiography); **8758** (γ-ray determination of welding defects); **8925** (bonding of Teflon); **8942** (joining polyethylene); **8957** (joining plastics).